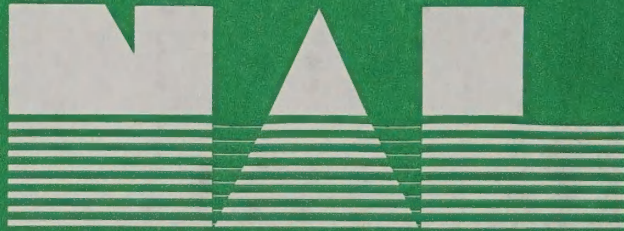


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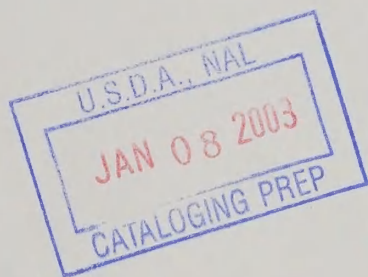
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Penjing Plants From China



Buxus sinica

Ehretia microphylla

Podocarpus macrophyllus

Sageretia thea

Serissa foetida

Biological Assessment and Taxonomic Support
Plant Protection and Quarantine
Animal and Plant Health Inspection Service
United States Department of Agriculture

October 16, 1996

Penjing Plants From China

Pest Risk Assessments

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Biological Assessment and Taxonomic Support
Plant Protection and Quarantine
Animal and Plant Health Inspection Service
United States Department of Agriculture

October 16, 1996

Importation of Chinese Penjing

into the United States

With Particular Reference to *Buxus sinica*

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A. Introduction

This pest risk assessment (PRA) was conducted by the United States Department of Agriculture, Animal and Plant Health Inspection Service, Plant Protection and Quarantine, Biological Assessment and Taxonomic Support Staff (USDA, APHIS, PPQ, BATS) on *Buxus sinica* penjing, established in a growing medium, from China. The results are expressed qualitatively ("high" or "low"), rather than quantitatively (probabilities or frequencies). The risk assessment methodology and rating criteria can be found in the document: *Pathway-Initiated Pest Risk Assessment: Guidelines for Qualitative Assessments* (USDA, 1995) (available from the authors of this risk assessment). Authority for APHIS to regulate plant pests/plant products is derived from the Plant Quarantine Act of 1912, the Plant Pest Act of 1957, the Noxious Weed Act of 1974 and the Code of Federal Regulations, Title 7, Part 319, Subpart 37 (7 CFR 319.37- Nursery Stock, Plants, Roots, Bulbs, Seeds and Other Plant Products). The methods and terminology used to initiate, conduct, and report this PRA are consistent with guidelines provided by FAO (1995) and NAPPO (1995).

B. Risk Assessment

1. Initiating Event: Proposed Action

China has been exporting significant volumes of bare root bonsai plants into the United States for a number of years. In August, 1992 representatives of the China Animal and Plant Quarantine Service (CAPQ), requested permission to export penjing (landscape bonsai) established in growing media. A list of 112 plant species was submitted. From these plants; categorized by PPQ, as prohibited, postentry, and restricted; CAPQ was asked in January, 1994, to select five restricted species. Subsequently, CAPQ submitted a list of eight species, along with a list of pests or potential pests of each species. In April 1994, the BATS Staff identified five species as candidates for pest risk assessments: *Buxus sinica* (Buxaceae), *Ehretia (Carmona) microphylla* (Boraginaceae), *Podocarpus macrophyllus* (Podocarpaceae), *Sageretia thea (theazans)* (Rhamnaceae), and *Serissa foetida* (Rubiaceae).

There are special concerns associated with propagative material in growing media: the presence of biological contaminants may not be discernible by visual inspection (this includes both pre shipment and Port of Entry inspections); the infeasibility of complete inspection greatly increases the potential of the introduction of exotic organisms; the treatment(s) of the growing media may not be entirely efficacious; the continual hazard of pest infestation/reinfestation of "clean" plants.

2. Assessment of Weediness Potential of *Buxus* spp.

The results of the weediness screening for *Buxus* (Table 1) did not prompt a pest-initiated risk assessment.

Table 1: Process for Determining Weediness Potential of Commodity

Commodity: *Buxus* spp. (*Buxaceae*)

Phase 1: The genus *Buxus* consists of some 30 species of cultivated ornamental evergreen shrubs and small trees native to Western Europe, the Mediterranean, temperate East Asia, the West Indies, and Central America. *Buxus sempervirens* L., the Common Box, has long been cultivated in the United States.

Phase 2: Answer Yes or No to the following questions:

Is the genus listed in:

NO *Geographical Atlas of World Weeds* (Holm et al., 1979)

NO *World's Worst Weeds* (Holm et al., 1977)

NO *Report of the Technical Committee to Evaluate Noxious Weeds; Exotic Weeds for Federal Noxious Weed Act* (Gunn & Ritchie, 1982)

NO *Economically Important Foreign Weeds* (Reed, 1977)

NO Weed Science Society of America list (WSSA, 1989)

NO Is there any literature reference indicating weediness, e.g. *AGRICOLA*, *CAB*, *Biological Abstracts*, *AGRIS*; search on "species name" combined with "weed").

Phase 3: Conclusion:

- IF:**
1. The species is widely prevalent in the United States and the answer to all of the questions is **no**...Proceed with the pest risk assessment.
 2. The species is widely prevalent in the United States and the answer to **one** or more of the questions is **yes**...Proceed with the pest risk assessment, provide comments on findings in text, and incorporate findings regarding weediness into the Risk Elements described below.
 3. The species is new to or not widely prevalent in the United States and the answer to all of the questions is **no**...Proceed with the pest risk assessment.
 4. The species is new to or not widely prevalent in the United States and the answer to **one or more** of the questions is **yes**...Consult authority under the Federal Noxious Weed Act for listing plant species as a noxious weed and consider the advisability of performing a pest-initiated pest risk assessment on the plant species. Provide explanations of findings in text.

3. Previous Risk Assessments, Current Status and Pest Interceptions Decision History for *Buxus* spp. from China

None

Pest Interceptions on *Buxus* from China - FY85-95*Aleurotuberculatus* sp. (Homoptera: Aleyrodidae)

Diaspididae sp. (Homoptera)

Eurytoma sp. (Hymenoptera: Eurytomidae)*Parlagena buxi* (Takahashi) (Homoptera: Diaspididae)*Parlatoria* sp. (Homoptera: Diaspididae)*Microsphaeropsis* sp.

Sminthuridae sp. (Collembola)

4. Pests associated with *Buxus* spp. in China

Table 2. Pests of <i>Buxus</i>				
Scientific name	Dist. ¹	Host Genera ²	Codes ³	References
ARTHROPODA AND MOLLUSCA				
<i>Adoretus sinicus</i> Burmeister (Coleoptera: Scarabaeidae)	CN, HI	Camellia, Diospyros, Rosa, Frimiana, Vitis, Theobroma, Morus, Populus, Asparagus, Abelmoschus, Gossypium, Phaseolus	z(soil), h, n	China, 1995, INKTO No. 89; CFR 318.13
<i>Agrotis segetum</i> (D. & S.) (Lepidoptera: Noctuidae)	CN	Citrus, Malus, Olea, Vitis, Zea	n	China, 1995; Carter, 1984; INKTO No. 25
<i>Aleurocanthus woglumi</i> Ashby (Homoptera: Aleyrodidae)	CN, FL, TX	Buxus, Citrus, Carica, Coffea, Fortunella, Swinglea, Pyrus, Triphasia, Annona, Cydonia, Diospyros, Myrtus, Mangifera	g, n, z	CIE 1976; PNKTO, No. 15
<i>Aleurotuberculatus hikosanensis</i> Takahashi (Homoptera: Aleyrodidae)	CN	Buxus, Cinnamomum, Ilex, Eurya, Pittosporum	z	Mound and Halsey, 1978; China, 1995
<i>Aleurotuberculatus</i> sp. (Homoptera: Aleyrodidae)	CN	Buxus	n, z	China, 1995; PPQ interception
<i>Amphimallon solstitialis</i> (L.) (Coleoptera: Scarabaeidae)	CN	Beta, Pinus, Solanum, polyphagous	n, z(soil)	Browne, 1968; China, 1995 CIE, 1979; INKTO, No. 99.
<i>Anomala corpulenta</i> Motschulsky (Coleoptera: Scarabaeidae)	CN	Bases, Cunninghamia, Juglans, Juniperus, Pinus, Malus, Prunus, Sabina, Salix, Ulmus, Vericia	z (soil)	China, 1994, 1995

Scientific name	Dist. ¹	Host Genera ²	Codes ³	References
<i>Anomala cupripes</i> Hope (Coleoptera: Scarabaeidae)	CN	Buxus, Camellia, Delonix, Ficus, Dimocarpus, Hevea, Litchi, Mangifera	z (soil)	China, 1994, 1995, Gordon, 1994
<i>Aonidiella aurantii</i> (Maskell) (Homoptera: Diaspididae)	CN, US	Buxus, Citrus, Persea, polyphagous	c, z	China, 1994; CIE, 1968a; Dekle, 1965; Li and Liao, 1990; Nakahara, 1982
<i>Aphis fabae</i> (Scopoli) (Homoptera: Aphididae)	CN, US	Buxus, polyphagous	c, m	CIE, 1963; Stoetzel, 1994
<i>Aphis gossypii</i> Glover (Homoptera: Aphididae)	CN, US	polyphagous	c	China, 1995; CIE, 1968b
<i>Aphis rumicis</i> L. (Homoptera: Aphididae)	CN, US	Buxus, polyphagous	c, m	Smith and Parron, 1978; Wilson and Vickery, 1981; Zhang & Zhong, 1983
<i>Aporia crataegi</i> L. (Lepidoptera: Pieridae)	CN	Crataegus, Malus, Prunus, Pyrus, Salix, Ulmus, polyphagous	n	Anonymous, 1972, 1986; China, 1995; INKTO No. 149
<i>Ascotis selenaria</i> Schifferrmuller & Denis (Lepidoptera: Geometridae)	CN	<i>Buxus, Rosa, Sophora</i>	z, z(soil)	China, 1994, 1995
<i>Aspidiotus destructor</i> Signoret (Homoptera: Diaspididae)	CN, US	Buxus, Cocos, Pandanus, polyphagous	c, m	CIE, 1966a; Dekle, 1965; Nakahara, 1982
<i>Aspidiotus nerii</i> Bouché (Homoptera: Diaspididae)	CN, US	Buxus, polyphagous	c, z	China, 1994; Dekle, 1965; Nakahara, 1982
<i>Atractomorpha sinensis</i> Bol. (Orthoptera: Acrididae)	CN	Serissa, Oryza, Saccharum, Citrus, Morus, Cinnamomum, Salix, Prunus, Sapium, Rosa, Camellia, Ipomoea, Malus, Gossypium, Nocotiana, Zea, Triticum, Impatiens, Chrysanthemum	z (soil)	China, 1994, 1995
<i>Bradybaena ravidia</i> (Benson) (Mollusca: Bradybaenidae)	CN	Ehretia, Cymbidium, Iris, Chrysanthemum, Gardenia, Rosa, Prunus	n, z(soil), z.	PPQ interception, China, 1995; Likhachev and

Table 2. Pests of *Buxus*

Scientific name	Dist. ¹	Host Genera ²	Codes ³	References
				Rammelmeier, 1962
<i>Bradybaena similis</i> (Ferussac) (Mollusca: Bradybaenidae)	CN, US	Sageretia, Serissa, polyphagous	c, z, z(soil)	Chang and Chen, 1989; China, 1994; Dundee, 1970; Yen 1943
<i>Brevipalpus obovatus</i> Donnadieu (Acari: Tenuipalpidae)	CN, US	Buxus, polyphagous	c, z	China, 1994; Jeppson <i>et al.</i> , 1975
<i>Calospilos suspecta</i> (Warren) (Lepidoptera: Geometridae)	CN	Buxus	z (soil), z	China, 1995; Zheng & Li, 1987
<i>Ceroplastes pseudoceriferus</i> Green (Homoptera: Coccidae)	CN	Buxus, Camellia, Cedrus, Chaenomeles, Citrus, Cycas, Cunninghamia, Diospyros, Gardenia, Ilex, Magnolia, Morus, Nandina, Pinus, Podocarpus, Punica, Rosa, Salix, Ulmus, Litchi, Mangifera, Rosaceae	z	China, 1994, 1995; Park <i>et al</i> , 1990
<i>Ceroplastes floridensis</i> Comstock (Homoptera: Coccidae)	CN, US	Buxus, polyphagous	c, m	Hamon and Williams, 1984; Rawhy, <i>et al</i> , 1973; Saad, 1977
<i>Ceroplastes japonicus</i> Green (Homoptera: Coccidae)	CN	Buxus, Camellia, Gardenia, Prunus, Morus, Podocarpus, Malus, Magnolia, Citrus, Pyrus, Michelia	n, z	China, 1994, 1995; Gimpel, 1974; Kozar, <i>et al</i> , 1984
<i>Chrysodeixis chalcites</i> (Esper) (Lepidoptera: Noctuidae)	CN	Ficus, Brassica, Coffea, Cucumis, Cucurbita, Cynara, Echium, Glycine, Gossypium, Lycopersicon, Marrubium, Medicago, Nicotiana, Phaseolus, Salvia, Solanum, Trifolium, Utica, Zea	n	China, 1995; CIE, 1977; Goodey, 1991; Taylor, 1980
<i>Chrysomphalus aonidium</i> L. (Homoptera: Diaspididae)	CN, US	Buxus, polyphagous	c, m	CIE, 1988a; Dekle, 1965; Nakahara, 1982
<i>Chrysomphalus dictyospermi</i> (Morgan) (Homoptera: Diaspididae)	CN, US	Buxus, Podocarpus, polyphagous	c, m	CIE, 1969; Dekle, 1965; Garonna and Viggiani, 1989;

Table 2. Pests of *Buxus*

Scientific name	Dist. ¹	Host Genera ²	Codes ³	References
				Johnson & Lyon, 1982; Nakahara, 1982
<i>Clania minuscula</i> Butler (Lepidoptera: Psychidae)	CN	<i>Buxus</i> , <i>Acer</i> , <i>Bischofia</i> , <i>Camellia</i> , <i>Cupressus</i> , <i>Citrus</i> , <i>Lagerstroemia</i> , <i>Platanus</i> , <i>Punica</i> , <i>Salix</i> , <i>Sapium</i> , <i>Pinus</i> , <i>Ulmus</i> , <i>Pyrus</i> , <i>Prunus</i> , <i>Pyrus</i> , <i>Podocarpus</i> , <i>Vitis</i> , <i>Malus</i> , <i>Morus</i> , <i>Thea</i> , <i>Rosa</i> , <i>Ribes</i> , <i>Rubus</i> , <i>Castanea</i> , <i>Quercus</i> , <i>Salix</i> , <i>Populus</i> , <i>Fraxinus</i> , <i>Magnolia</i>	z	China, 1994, 1995; Kozhanchikov 1956; Shiraki, 1952
Coccidae, sp. (Homoptera: Coccidae)	CN	<i>Buxus</i>	n, z	China, 1994, 1995
<i>Conogethes punctiferalis</i> (Guenée) (Lepidoptera: Pyralidae)	CN	<i>Gossypium</i> , <i>Helianthus</i> , <i>Castanea</i> , <i>Pinus</i> , <i>Prunus</i> , <i>Pyrus</i> , <i>Sorghum</i> , <i>Zea</i>	n	China, 1995; INKTO
<i>Cryptothelea variegata</i> Snellen (Lepidoptera: Psychidae)	CN	<i>Buxus</i> , <i>Ginkgo</i> , <i>Malus</i> , <i>Pinus</i> , <i>Podocarpus</i> , <i>Rosa</i> , <i>Ulmus</i> , <i>Pyracantha</i> , <i>Casurina</i> , <i>Cinnamomum</i>	z	Browne, 1968; China, 1994; 1995; Kozhanchiv, 1956
Diaspididae sp. (Homoptera: Diaspididae)	CN	<i>Buxus</i>	n, z	China, 1995; PPQ interception
<i>Drosicha corpulenta</i> (Kuwana) (Homoptera: Margarodidae)	CN	<i>Buxus</i> , <i>Ficus</i> , <i>Magnolia</i> , <i>Paulownia</i> , <i>Plantanus</i> , <i>Salix</i> , <i>Melia</i> , <i>Sophora</i> , <i>Podocarpus</i> , <i>Ziziphus</i> , <i>Diospyros</i> , <i>Malus</i> , <i>Pyrus</i> , <i>Citrus</i> , <i>Prunus</i> , <i>Castanea</i> , <i>Quercus</i>	z (soil), z	China, 1994, 1995; Shiraki, 1952
<i>Eurytoma</i> sp. (Hymenoptera: Eurytomidae)	CN	<i>Buxus</i>	z _e	PPQ interception
<i>Glyphodes perspectalis</i> (Walker) (Lepidoptera: Pyralidae)	CN	<i>Buxus</i>	z	Tang <i>et al</i> , 1990
<i>Gryllotalpa africans</i> Palisot de Beauvois (Orthoptera: Gryllotalpidae)	CN	<i>Solanum</i> , <i>Saccharum</i> , <i>Gossypium</i> , <i>Vitis</i> , <i>Fragaria</i> , <i>Camellia</i> , <i>Dianthus</i> , <i>Prunus</i> , <i>Fortunella</i> , <i>Pinus</i> , <i>Nicotiana</i>	n, z (soil)	China, 1995; INKTO, No. 197
<i>Helicoverpa armigera</i> (Hübner) (Lepidoptera: Noctuidae)	CN	<i>Glycine</i> , <i>Gossypium</i> , <i>Lycopersicon</i> , <i>Medicago</i> ,	n	China, 1995; CIE, 1993a; Avidov and

Table 2. Pests of <i>Buxus</i>				
Scientific name	Dist. ¹	Host Genera ²	Codes ³	References
(Lepidoptera: Noctuidae)		Nicotiana, Solanum, Tagetes, Triticum, Zea		Harpaz, 1969
<i>Helicoverpa assulta</i> (Guenée) (Lepidoptera: Noctuidae)	CN	Capsicum, Cucumis, Gossypium, Ipomoea, Nicotiana, Sorghum, Zea	n	China, 1995; CIE, 1994
<i>Icerya aegyptica</i> (Douglas) (Homoptera: Margarodidae)	CN	Citrus, Cinnamomum, Diospyros, Ficus, Morus, Psidium, >100 hosts	n	China, 1995; CIE, 1966b; INKTO No. 119; Williams, 1985
<i>Icerya purchasi</i> Maskell (Homoptera: Margarodidae)	CN, US	<i>Buxus</i> , polyphagous	c, z	China, 1994, CIE, 1971; Myer, 1978; Salama, <i>et al</i> , 1985
<i>Icerya seychellarum</i> (Westwood) (Homoptera: Margarodidae)	CN	Sapium, Camellia, Acer, Podocarpus, Psidium, Citrus, Pyrus, Prunus, Rosa, Cycas, Eriobotrya, Morus, Thea, Trachycarpus, >100 hosts	n	China, 1995; CIE, 1955; PNKTO, No. 21
<i>Lycorma delicatula</i> White (Homoptera: Fulgoridae)	CN	<i>Buxus</i> , Catalpa, Glycine, Ligustrum, Malus, Melia, Populus, Platanus, Prunus, Quercus, Ulmus, Toona	z	China, 1994, 1995; Mahmood, 1976; Metcalf, 1947
<i>Mamestra brassicae</i> (L.) (Lepidoptera: Noctuidae)	CN	Beta, Brassica, Daucus, Gossypium, Morus, Pisum, Nicotiana, Saccharum, Solanum, Triticum, Vicia	n	China, 1995; INKTO, No. 61
<i>Myzus persicae</i> (Sulzer) (Homoptera: Aphididae)	CN, US	<i>Buxus</i> , polyphagous	c	Blackman and Eastop, 1994; Zhang & Zhong, 1983
<i>Parasaissetia nigra</i> (Nietner) (Homoptera: Coccidae)	CN, US	<i>Buxus</i> , polyphagous	c, m	Hamon and Williams, 1984;
<i>Parlagena buxi</i> (Takahashi) (Homoptera: Diaspididae)	CN	<i>Buxus</i> , <i>Euonymus</i> , <i>Ulmus</i> , <i>Ziziphus</i>	n, z	China, 1994, 1995; PPQ interception
<i>Parlatoria pergandii</i> Comstock (Homoptera: Diaspididae)	CN, US	<i>Buxus</i> , polyphagous	c, z	China, 1994, Dekle, 1965; Nakahara, 1982; Shen and Liu, 1990
<i>Parlatoria proteus</i> (Curtis) (Homoptera: Diaspididae)	CN, US	<i>Buxus</i> , polyphagous	z	Dekle, 1965; Nakahara, 1982

Table 2. Pests of *Buxus*

Scientific name	Dist. ¹	Host Genera ²	Codes ³	References
<i>Parlatoria</i> sp. (Homoptera: Diaspididae)	CN	<i>Buxus</i>	n, z	China, 1995; PPQ interception
<i>Parlatoria ziziphi</i> (Lucas) (Homoptera: Diaspididae)	CN, FL, HI	<i>Buxus</i> , Citrus	g, z	China, 1994; CIE, 1964; PNKTO, No. 15
<i>Phyllophaga</i> sp. (Coleoptera: Scarabaeidae)	CN	<i>Serissa</i> , polyphagous	n, z(soil), z.	China, 1995; PPQ interception
<i>Phyllophaga titanis</i> Reitter (Coleoptera: Scarabaeidae)	CN	<i>Buxus</i> , Rosa, Sophora, Ulmus, polyphagous	z (soil)	China, 1994, 1995; Gordon, 1994
<i>Pinnaspis buxi</i> Bouché (Homoptera; Diaspididae)	CN, US	<i>Buxus</i> , <i>Cocos</i> , Pandanus, Citrus, polyphagous	c, z	Nakahara, 1982; Song, <i>et al</i> , 1989
<i>Pinnaspis strachani</i> (Cooley) (Homoptera: Diaspididae)	CN, US	<i>Buxus</i> , polyphagous	c, m	Dekle, 1965; Nakahara, 1982
<i>Pryeria sinica</i> Moore (Lepidoptera: Zygaenidae)	CN	<i>Buxus</i> , <i>Euonymus</i>	z	Anonymous, 1986; China, 1994, 1995
<i>Pseudaonidia clavigera</i> (Ckll) (Homoptera: Diaspididae)	CN, US	<i>Buxus</i> , polyphagous	c, m	Dekle, 1965; Nakahara, 1982
<i>Pseudaulacaspis pentagona</i> (Targioni & Tozzetti) (Homoptera: Diaspididae)	CN, US	<i>Buxus</i> , Diospyros, Prunus, Melia, polyphagous	m	Dekle, 1965; Nakahara, 1982
<i>Rhizoecus hibisci</i> Kawai & Takagi (Homoptera: Pseudococcidae)	CN, HI	<i>Serissa</i> , <i>Cryptanthus</i> , <i>Carex</i> , <i>Rhaphis</i> , <i>Crinum</i> , <i>Cuphea</i> , <i>Hibiscus Dieffenbachia</i> , <i>Hakonechloa</i> , <i>Nerium</i> , <i>Pelargonium</i> , <i>Phoenix</i> , <i>Sabal</i> , <i>Zelkova</i>	z (soil)	EPPO, 1996a, b
<i>Ricania sublimbata</i> Jacobi (Homoptera; Ricaniidae)	CN	<i>Buxus</i> , Citrus, Ligustrum	z (oviposition in xylem)	China, 1995; Xu and Zhong, 1988
<i>Saissetia coffeae</i> (Walker) (Homoptera: Coccidae)	CN, US	<i>Buxus</i> , polyphagous	m	CIE, 1973a; Hamon and Williams, 1984; Squire, 1972
Sminthuridae, sp. (Collembola: Sminthuridae)	CN	<i>Buxus</i>	n, z	China, 1995; PPQ interception
<i>Spodoptera litura</i> (F.) (Lepidoptera: Noctuidae)	CN	Arachis, Beta, Brassica, Citrus, Glycine, Gossypium,	n	China, 1995; CIE, 1993b; INKTO,

Table 2. Pests of <i>Buxus</i>				
Scientific name	Dist. ¹	Host Genera ²	Codes ³	References
		Ipomoea, Morus, Nicotiana, Oryza, Solanum, Sorghum, Ulmus, Zea		No. 12
<i>Sympiezomias velatus</i> Chevrolet (Coleoptera: Curculionidae)	CN	Sophora, Populus, Morus, Glycine, Beta, Castanea, 70 genera, 101 species recorded.	z(soil), z	China, 1995
<i>Thosea sinensis</i> (Walker) (Lepidoptera: Limacodidae)	CN	Buxus, Acer, Cinnamomum, Diospyros, Malus, Metasequoia, Osmanthus, Paulownia, Zizyphus	n, z	Bourke <i>et al.</i> , 1969; China, 1994, 1995; Hu and Wang, 1969
<i>Thrips palmi</i> Karny (Thysanoptera: Thripidae)	CN, FL, HI	polyphagous	g, n	CIE, 1992; Smith <i>et al.</i> , 1992
<i>Tridactylus japonicus</i> de Hoan (Orthoptera: Trydactilidae)	CN	Buxus, Camellia, Cedrus, Fragaria, Gossypium, Oryza, Nicotiana, Rosa, Sabina, Saccharinum	z (soil), z	China, 1994, 1995; Shiraki, 1952
<i>Unaspis yanonensis</i> (Kuwana) (Homoptera: Diaspididae)	CN	Buxus, Citrus, Camellia, Punica, Osmanthus, Prunus	n, z	China, 1994, 1995; CIE, 1988b; PNKTO, No. 45; Reu <i>et al.</i> , 1990; Tanaka, 1981; Wang, 1981
<i>Zeuzera coffeae</i> Nietner (Lepidoptera: Cossidae)	CN	Buxus, Gossypium, Metasequoia, Platanus, Pterocarya, Punica, Sapium, Sophora, Zea	z	China, 1994, 1995; CIE, 1973b; Tang, <i>et al.</i> , 1990
FUNGI				
<i>Cercospora destructiva</i> (Ravenel) Ellis & Everh. (Fungi Imperfecti, Hyphomycetes)	CN, US	Buxus, Euonymus	o,Zei	China, 1992; Farr, <i>et al.</i> , 1989
<i>Dennisiella babingtonii</i> (Berk.) Batista & Cif. Anamorph: <i>Microxiphium fagi</i> (Pers.) S. J. Hughes (Loculoascomycetes, Dothideales)	CN, US	Buxus, Ilicium	o,Zei	China, 1992; Farr, <i>et al.</i> , 1989
<i>Fusarium oxysporum</i> Schlechtend.:Fr. (Fungi Imperfecti, Hyphomycetes)	CN, US	Buxus, Various genera	o,Zei	China, 1992; Farr <i>et al.</i> , 1989
<i>Glomerella cingulata</i> (Stoneman)	CN, US	Buxus, Various genera	o,Zei	Farr <i>et al.</i> , 1989

Table 2. Pests of *Buxus*

Scientific name	Dist. ¹	Host Genera ²	Codes ³	References
Spaulding & Schrenk Anamorph: <i>Colletotrichum gloeosporoides</i> (Penz.) Penz., & Sacc. in Penz. (Pyrenomycetes, Phyllachorales)				
<i>Guignardia miribelii</i> van der Aa Anamorph: <i>Sarcophoma miribelii</i> (Fr.) Hohn. Syn.: <i>Macrophoma miribelii</i> (Fr.) Berl. & Vogl. (Loculoascomycetes, Dothideales)	CN	Buxus	Z _{ei}	China, 1995; Sutton, 1980
<i>Macrophoma ehretia</i> Cook & Mass. (Fungi Imperfecti, Coelomycetes)	CN	Buxus, Ehretia	Z _{ei}	China, 1995; Farr, <i>et al.</i> , 1989; Tai, 1979
<i>Meliola buxicola</i> Doidge (Pyrenomycetes, Meliolales)	CN	Buxus	Z _{ei}	Tai, 1979
<i>Microsphaera euonymi-japonici</i> Vien.-Bourg. Anamorph: <i>Oidium euonymi-japonici</i> (Arcang.) Sacc. in E. S. Salmon (Pyrenomycetes, Erysiphales)	CN, US	Euonymus	o,Z _{ei}	China, 1992; Farr, 1994; Farr, <i>et al.</i> , 1989
<i>Pestalotia breviseta</i> Sacc. (Fungi Imperfecti, Coelomycetes)	CN, US	Acacia, Buxus, Quercus	o,Z _{ei}	China, 1992; Farr <i>et al.</i> , 1989
<i>Phoma</i> sp. (Fungi Imperfecti, Coelomycetes)	CN	Buxus	Z _{ei}	China, 1992; PPQ interception
<i>Phyllosticta nandinae</i> Tassi (Fungi Imperfecti, Coelomycetes)	CN, US	Buxus, Nandina	o,Z _{ei}	China, 1992; Farr <i>et al.</i> , 1989
<i>Puccinia buxi</i> DC Syn.: <i>Dasyscypha buxi</i> Arth. (Basidiomycetes, Uredinales)	CN	Buxus	n,Z _{ei}	BATS 309 Database, 1990; China, 1992; Farr, 1994; Smith, <i>et al.</i> , 1988
<i>Thanatephorus cucumeris</i> (A.B. Frank) Donk Anamorph: <i>Rhizoctonia solani</i> Kühn (Basidiomycetes, Tulasnellales)	CN, US	Various genera	o,Z _{ei}	China 1992; Teng, 1996
NEMATODA				

Table 2. Pests of <i>Buxus</i>				
Scientific name	Dist. ¹	Host Genera ²	Codes ³	References
<i>Aphelenchoides besseyi</i> Christie (Aphelenchoididae)	CN, US	Various genera	z(soil)	Anonymous, 1984; EPPO, 1996a
<i>Aphelenchus</i> sp. (Species unknown) (Aphelenchidae)	CN	Unknown	z(soil)	EPPO, 1996a
<i>Criconemella</i> sp. (Species unknown) (Criconematidae)	CN	Unknown	z(soil)	EPPO, 1996a
Dorylaimidae (Genus and species unknown) (Dorylaimidae)	CN	Unknown	z(soil)	EPPO, 1996a
<i>Dorylaimus</i> sp. (Species unknown) (Dorylaimidae)	CN	Unknown	z(soil)	EPPO, 1996b
<i>Helicotylenchus</i> sp. (Species unknown) (Hoplolaimidae)	CN	Unknown	z(soil)	EPPO, 1996a; 1996b
<i>Helicotylenchus dihystra</i> (Cobb) Sher Syn: <i>Tylenchus dihystra</i> Cobb (Hoplolaimidae)	CN, US	<i>Buxus</i> , Various genera	o, z(soil)	Anonymous, 1984; China 1992; 1995; EPPO, 1996a; 1996b
<i>Hirschmanniella</i> sp. (Species unknown) (Pratylenchidae)	CN	Unknown	z(soil)	EPPO, 1996a; 1996b
<i>Meloidogyne incognita</i> (Chitwood) (Heteroderidae)	CN, US	<i>Buxus</i> , Various genera	o, z(soil)	Anonymous, 1984; China, 1992
<i>Meloidogyne</i> sp. (Species unknown) (Heteroderidae)	CN	Unknown	z(soil)	EPPO, 1996b
<i>Nacobbus aberrans</i> (Thorne) Thorne & Allen Syn.: <i>Pratylenchus aberrans</i> (Thorne) Filipjev (Nacobbidae)	CN, US	<i>Buxus</i> , Various genera	o, z(soil)	Anonymous, 1984; China, 1992
<i>Paratrophorus</i> sp. (Species unknown) (Belonolaimiidae)	CN	Unknown	z(soil)	EPPO, 1996a

Table 2. Pests of *Buxus*

Scientific name	Dist. ¹	Host Genera ²	Codes ³	References
<i>Pratylenchus brachyurus</i> (Godfrey) Filipjev & Schuurmans Stekhoven (Pratylenchidae)	CN, US	Various genera	o, z(soil)	Anonymous, 1984; EPPO, 1996b
<i>Pratylenchus penetrans</i> (Cobb) Filipjev & Stekhkoven (Pratylenchidae)	CN, US	<i>Buxus</i> , Various genera	o, z(soil)	Anonymous, 1984; China, 1995
<i>Pratylenchus</i> sp. (Species unknown) (Pratylenchidae)	CN	Unknown	z(soil)	EPPO, 1996a; 1996b
<i>Rotylenchus robustus</i> (deMan) Filipjev (Hoplolaimidae)	CN, US	Various genera	o, z(soil)	EPPO, 1996b
<i>Trichodorus</i> sp. (Species unknown) (Trichodoridae)	CN	Unknown	z(soil)	EPPO, 1996a
<i>Tylenchorhynchus</i> sp. (Species unknown) (Tylenchorhynchidae)	CN	Unknown	z(soil)	EPPO, 1996a
<i>Tylenchorhynchus crassicaudatus</i> Williams (Tylenchorhynchidae)	CN	<i>Oryza</i>	z(soil)	EPPO, 1996a; 1996b
<i>Tylenchorhynchus leviterminalis</i> Siddiqi, Mukherjee & Dasgupta (Tylenchorhynchidae)	CN, not in US	Unknown	z(soil)	EPPO, 1996a; 1996b
<i>Tylenchus</i> sp. (Species unknown) (Tylenchidae)	CN	Unknown	z(soil)	EPPO, 1996a
<i>Xiphinema brasiliense</i> Lordello (Longidoridae)	CN,US (FL)		o, z(soil)	EPPO, 1996b
<i>Xiphinema</i> sp. (Species unknown) (Longidoridae)	CN	Unknown	z(soil)	EPPO, 1996a; 1996b

¹Geographical distribution is denoted as follows: CN-People's Republic of China, FL-Florida, HI-Hawaii, TX-Texas, US- United States

²Host genera identified in literature and by CAPQ

³Codes: c - Listed in USDA catalogue of intercepted pests as non-actionable.

e - Although pest attacks commodity, it would not be expected to remain with the commodity (plant

part) during processing

- g - Quarantine pest; pest has limited distribution in the U.S. and is under official control as follows: pest listed by name in USDA's pest dictionary, official quarantine action may be taken on this pest when intercepted on this commodity.
- h - Quarantine pest; pest has limited distribution in the U.S. and is under official control as follows: (1) pest listed by name in USDA's pest dictionary, official quarantine action may be taken on this pest when intercepted on this commodity and, (2) pest is a program pest (there is an official Federal or recognized State program for control of this pest beyond its being listed in the pest dictionary as actionable.)
- m - the pest occurs within the PRA area and has been reported to attack the specified host species in other geographic regions; but has not been reported to attack the specified host species in the PRA area.
- n - Listed in the USDA catalogue of intercepted pests as actionable.
- o - Organism does not meet the geographical and regulatory definition for a quarantine pest.
- z_i - Internal feeder: Pest is known to attack or infect commodity and it would be reasonable to expect the pest may remain with the commodity during processing and shipping
- z_e - External feeder: Pest is known to commonly attack or infect commodity and it would be reasonable to expect the pest may remain with the commodity during processing and shipping.

5. List of Quarantine Pests

Table 3. Quarantine Pests - *Buxus***ARTHROPODA**

- Adoretus sinicus* Burmeister (Coleoptera: Scarabaeidae)
Agrotis segetum (D. & S.) (Lepidoptera: Noctuidae)
Aleurocanthus woglumi Ashby (Homoptera: Aleyrodidae)
Aleurotuberculatus hikosanensis Takahashi (Homoptera: Aleyrodidae)
Amphimallon solstitialis (L.) (Coleoptera: Scarabaeidae)
Anomala corpulenta Motschulsky (Coleoptera: Scarabaeidae)
Anomala cupripes Hope (Coleoptera: Scarabaeidae)
Aporia crataegi L. (Lepidoptera: Pieridae)
Ascotis selenaria Schiffer-Muller & Denis (Lepidoptera: Geometridae)
Atractomorpha sinensis Bol. (Orthoptera: Acrididae)
Calospilos suspecta (Warren) (Lepidoptera: Geometridae)
Ceroplastes pseudoceriferus Green (Homoptera: Coccidae)
Ceroplastes japonicus Green (Homoptera: Coccidae)
Chrysodeixis chalcites (Esper) (Lepidoptera: Noctuidae)
Clania minuscula Butler (Lepidoptera: Psychidae)
Conogethes punctiferalis (Guenée) (Lepidoptera: Pyralidae)
Cryptothelea variegata Snellen (Lepidoptera: Psychidae)
Drosicha corpulenta (Kuwana) (Homoptera: Margarodidae)
Glyphodes perspectalis (Walker) (Lepidoptera: Pyralidae)
Gryllotalpa africans Palisot de Beauvois (Orthoptera: Gryllotalpidae)
Helicoverpa armigera (Hübner) (Lepidoptera: Noctuidae)
Helicoverpa assulta (Guenée) (Lepidoptera: Noctuidae)
Icerya aegyptica (Douglas) (Homoptera: Margarodidae)
Icerya seychellarum (Westwood) (Homoptera: Margarodidae)
Lycorma delicatula White (Homoptera: Fulgoridae)
Mamestra brassicae (L.) (Lepidoptera: Noctuidae)
Parlagona buxi (Takahashi) (Homoptera: Diaspididae)
Parlatoria ziziphi (Lucas) (Homoptera: Diaspididae)
Phyllophaga titanis Reitter (Coleoptera: Scarabaeidae)
Pryeria sinica Moore (Lepidoptera: Zygaenidae)
Rhizoecus hibisci Kawai & Takagi (Homoptera: Pseudococcidae)
Ricania sublimbata Jacobi (Homoptera: Ricaniidae)
Spodoptera litura (F.) (Lepidoptera: Noctuidae)
Sympiezomias velatus Chevrollet (Coleoptera: Curculionidae)
Thosea sinensis (Walker) (Lepidoptera: Limacodidae)
Thrips palmi Karny (Thysanoptera: Thripidae)
Tridactylus japonicus de Hoan (Orthoptera: Trydactilidae)
Unaspis yanonensis (Kuwana) (Homoptera: Diaspididae)
Zeuzera coffeae Nietner (Lepidoptera: Cossidae)

MOLLUSCA

Bradybaena ravid (Benson) (Mollusca: Bradybaenidae)

FUNGI

Guignardia miribelii van der Aa (Loculoascomycetes, Dothideales)

Macrophoma ehretia Cook & Mass. (Fungi Imperfecti, Coelomycetes)

Meliola buxicola Doidge (Pyrenomycetes, Meliolales)

Puccinia buxi DC (Basidiomycetes, Uredinales)

NEMATODA

Paratrophorus sp. (Belonolaimiidae)

Tylenchorhynchus crassicaudatus (Tylenchorhynchidae)

Tylenchorhynchus leviterminalis (Tylenchorhynchidae)

6. Quarantine Pests Likely to Follow Pathway

Table 4. Quarantine Pests Likely to Follow Pathway - *Buxus*

ARTHROPODA

- Adoretus sinicus* Burmeister (Coleoptera: Scarabaeidae)
Aleurocanthus woglumi Ashby (Homoptera: Aleyrodidae)
Aleurotuberculatus hikosanensis Takahashi (Homoptera: Aleyrodidae)
Amphimallon solstitialis (L.) (Coleoptera: Scarabaeidae)
Anomala corpulenta Motschulsky (Coleoptera: Scarabaeidae)
Anomala cupripes Hope (Coleoptera: Scarabaeidae)
Ascotis selenaria Schiffer-Muller & Denis (Lepidoptera: Geometridae)
Atractomorpha sinensis Bol. (Orthoptera: Acrididae)
Calospilos suspecta (Warren) (Lepidoptera: Geometridae)
Ceroplastes pseudoceriferus Green (Homoptera: Coccidae)
Ceroplastes japonicus Green (Homoptera: Coccidae)
Clania minuscula Butler (Lepidoptera: Psychidae)
Cryptothoelea variegata Snellen (Lepidoptera: Psychidae)
Drosicha corpulenta (Kuwana) (Homoptera: Margarodidae)
Glyphodes perspectalis (Walker) (Lepidoptera: Pyralidae)
Gryllotalpa africans Palisot de Beauvois (Orthoptera: Gryllotalpidae)
Lycorma delicatula White (Homoptera: Fulgoridae)
Parlagona buxi (Takahashi) (Homoptera: Diaspididae)
Parlatoria ziziphi (Lucas) (Homoptera: Diaspididae)
Phyllophaga titanis Reitter (Coleoptera: Scarabaeidae)
Pryeria sinica Moore (Lepidoptera: Zygaenidae)
Rhizoecus hibisci Kawai & Takagi (Homoptera: Pseudococcidae)
Ricania sublimbata Jacobi (Homoptera: Ricaniidae)
Thosea sinensis (Walker) (Lepidoptera: Limacodidae)
Thrips palmi Karny (Thysanoptera: Thripidae)
Tridactylus japonicus de Hoan (Orthoptera: Trydactilidae)
Unaspis yanonensis (Kuwana) (Homoptera: Diaspididae)
Zeuzera coffeae Nietner (Lepidoptera: Cossidae)

MOLLUSCA

- Bradybaena ravida* (Benson) (Mollusca: Bradybaenidae)

FUNGI

- Guignardia miribelii* van der Aa (Loculoascomycetes, Dothideales)
Macrophoma ehretia Cook & Mass. (Fungi Imperfecti, Coelomycetes)
Meliola buxicola Doidge (Pyrenomycetes, Meliolales)
Puccinia buxi DC (Basidiomycetes, Uredinales)

NEMATODA

- Paratrophorus* sp. (Belonolaimiidae)
Tylenchorhynchus crassicaudatus (Tylenchorhynchidae)
Tylenchorhynchus leviterminalis (Tylenchorhynchidae)

Other organisms in this Assessment, not chosen for further scrutiny, may be potentially detrimental to the agricultural production systems of the United States. However, there were a

variety of reasons for not subjecting them to further analysis: they maybe associated with the commodity (however, it was not considered reasonable to expect these pests to remain with the commodity during processing); they have been intercepted, as biological contaminants, by PPQ Officers during inspections of these commodities and would not be expected to be found with every shipment.

7. Economic Importance: Consequences of Introduction

Pests rated for potential economic importance are evaluated against five biological factors. The cumulative score for these elements is the Risk Rating (USDA, 1995).

Pest	Climate/ Host	Host Range	Dispersal	Economic	Environ- mental	Risk Rating
<i>Adoretus sinicus</i>	H	H	H	M	M	H
<i>Aleurocanthus woglumi</i>	H	H	H	M	M	H
<i>Aleurotuberculatus hikosanensis</i>	H	H	H	M	M	H
<i>Amphimallon solstitialis</i>	H	H	H	M	M	H
<i>Anomala corpulenta</i>	H	H	H	M	M	H
<i>Anomala cupripes</i>	H	H	H	M	M	H
<i>Ascotis selenaria</i>	H	H	H	M	M	H
<i>Atractomorpha sinensis</i>	H	H	H	M	M	H
<i>Bradybaena ravida</i>	H	H	H	M	M	H
<i>Calospilos suspecta</i>	H	L	H	M	M	M
<i>Ceroplastes pseudoceriferus</i>	H	H	H	M	M	H
<i>Ceroplastes japonicus</i>	H	H	H	M	M	H
<i>Clania minuscula</i>	H	H	H	M	M	H

<i>Cryptothelea variegata</i>	H	H	H	M	M	H
<i>Drosicha corpulentata</i>	H	H	H	M	M	H
<i>Glyphodes perspectalis</i>	H	L	H	M	M	M
<i>Gryllotalpa africans</i>	H	H	H	M	M	H
<i>Lycorma delicatula</i>	H	H	H	M	M	H
<i>Parlagena buxi</i>	H	H	H	M	M	H
<i>Parlatoria ziziphi</i>	H	H	H	M	M	H
<i>Phyllophaga titanis</i>	H	H	H	M	M	H
<i>Pryeria sinica</i>	H	H	H	M	M	H
<i>Rhizoecus hibisci</i>	H	H	H	M	M	H
<i>Ricania sublimbata</i>	H	H	H	M	M	H
<i>Thosea sinensis</i>	H	H	H	M	M	H
<i>Thrips palmi</i>	H	H	H	M	M	H
<i>Tridactylus japonicus</i>	H	H	H	M	M	H
<i>Unaspis yanonensis</i>	H	H	H	M	M	H
<i>Zeuzera coffeae</i>	H	H	H	M	M	H
<i>Guignardia miribelii</i>	H	L	H	M	M	M
<i>Macrophoma ehretia</i>	H	H	H	M	M	H
<i>Meliola buxicola</i>	H	L	H	M	M	M
<i>Puccinia buxi</i>	H	L	H	M	M	M
<i>Paratrophorus</i> sp.	H	M	H	M	M	H

<i>Tylenchorhynchus crassicaudatus</i>	H	M	H	M	M	H
<i>Tylenchorhynchus leviterminalis</i>	H	M	H	M	M	H

8. Likelihood of Introduction

The likelihood of introduction for a pest is rated relative to six factors (Tables 6 and 7) (USDA, 1995)

Table 6: Amount of Commodity Shipped	
Number of 40' Containers Annually	Rating
10 - 100	M

Table 7: Risk Rating - Likelihood of Introduction						
Pest	Likelihood of surviving postharvest treatment	Likelihood of surviving shipment	Likelihood of not being detected at port of entry	Likelihood of moving to suitable habitat	Likelihood of finding suitable hosts	Risk Rating
<i>Adoretus sinicus</i>	H	H	H	H	H	H
<i>Aleurocanthus woglumi</i>	H	H	M	H	H	H
<i>Aleurotuberculatus hikosanensis</i>	H	H	M	H	H	H
<i>Amphimallon solstitialis</i>	H	H	H	H	H	H
<i>Anomala corpulenta</i>	H	H	H	H	H	H
<i>Anomala cupripes</i>	H	H	H	H	H	H
<i>Ascotis selenaria</i>	H	H	H	H	H	H
<i>Atractomorpha sinensis</i>	H	H	H	H	H	H
<i>Bradybaena ravida</i>	H	H	H	H	H	H
<i>Calospilos suspecta</i>	H	H	H	H	H	H
<i>Ceroplastes pseudoceriferus</i>	H	H	M	H	H	H

<i>Ceroplastes japonicus</i>	H	H	M	H	H	H
<i>Clania minuscula</i>	H	H	M	H	H	H
<i>Cryptothelea variegata</i>	H	H	M	H	H	H
<i>Drosicha corpulenta</i>	H	H	H	H	H	H
<i>Glyphodes perspectalis</i>	H	H	M	H	H	H
<i>Gryllotalpa africans</i>	H	H	H	H	H	H
<i>Lycorma delicatula</i>	L	H	M	H	H	H
<i>Parlagena buxi</i>	H	H	M	H	H	H
<i>Parlatoria ziziphi</i>	H	H	M	H	H	H
<i>Phyllophaga titanis</i>	H	H	H	H	H	H
<i>Pryeria sinica</i>	H	H	M	H	H	H
<i>Rhizoecus hibisci</i>	H	H	H	H	H	H
<i>Ricania sublimbata</i>	H	H	H	H	H	H
<i>Thosea sinensis</i>	H	H	M	H	H	H
<i>Thrips palmi</i>	H	H	M	H	H	H
<i>Tridactylus japonicus</i>	H	H	H	H	H	H
<i>Unaspis yanonensis</i>	H	H	M	H	H	H
<i>Zuezera coffeae</i>	H	H	M	H	H	H
<i>Guignardia miribelii</i>	H	H	M	H	H	H
<i>Macrophoma ehretiae</i>	H	H	M	H	H	H
<i>Meliola buxicola</i>	H	H	M	H	H	H
<i>Puccinia buxi</i>	H	H	M	H	H	H
<i>Paratrophorus</i> sp.	H	H	H	H	H	H
<i>Tylenchorhynchus crassicaudatus</i>	H	H	H	H	H	H
<i>Tylenchorhynchus</i>						

<i>leviterminalis</i>	H	H	H	H	H	H
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9. Pest Risk Potential

Pest Risk Potential is the combination of the consequences and likelihood of introductions (Tables 5, 6 and 7) (USDA, 1995).

Pest	Pest Risk Potential
<i>Adoretus sinicus</i>	H
<i>Aleurocanthus woglumi</i>	H
<i>Aleurotuberculatus hikosanensis</i>	H
<i>Amphimallon solstitialis</i>	H
<i>Anomala corpulenta</i>	H
<i>Anomala cupripes</i>	H
<i>Ascotis selenaria</i>	H
<i>Atractomorpha sinensis</i>	H
<i>Bradybaena ravida</i>	H
<i>Calospilos suspecta</i>	H
<i>Ceroplastes pseudoceriferus</i>	H
<i>Ceroplastes japonicus</i>	H
<i>Clania minuscula</i>	H
<i>Cryptothelea variegata</i>	H
<i>Drosicha corpulenta</i>	H
<i>Glyphodes perspectalis</i>	H
<i>Gryllotalpa africans</i>	H
<i>Lycorma delicatula</i>	H
<i>Parlagena buxi</i>	H

<i>Parlatoria proteus</i>	H
<i>Parlatoria ziziphi</i>	H
<i>Phyllophaga titanis</i>	H
<i>Pryeria sinica</i>	H
<i>Rhizoecus hibisci</i>	H
<i>Ricania sublimbata</i>	H
<i>Thosea sinensis</i>	H
<i>Thrips palmi</i>	H
<i>Tridactylus japonicus</i>	H
<i>Unaspis yanonensis</i>	H
<i>Zeuzera coffeae</i>	H
<i>Guignardia miribelii</i>	H
<i>Macrophoma ehretia</i>	H
<i>Meliola buxicola</i>	H
<i>Puccinia buxi</i>	H
<i>Paratrophorus</i> sp.	H
<i>Tylenchorhynchus crassicaudatus</i>	H
<i>Tylenchorhynchus leviterminalis</i>	H

Phytosanitary Measures

Numerous potential biological hazards are associated with the importation of propagative material in growing media. In the case of Chinese penjing, the plants are grown in the open, in proximity to the ground and in or around agricultural production areas. Other factors which exacerbate the pest risk are inadequate pest control, plants collected from the wild, the continual flow of plant material into and out of facilities and soil movement from adjacent agricultural areas. These conditions act in concert to produce a great potential for contaminants, pest organisms of plants from nature and windborne infestations to establish in the nursery stock.

From the perspective of this risk assessment, most of the organisms of concern (some arthropods, snails, nematodes and weed seeds) are soil inhabitants during at least one portion of their life histories. Other potential hazards include fungal fruiting bodies with a latent period. These

organisms have a high Pest Risk Potential and will require specific measures to insure phytosanitary security. Accordingly, mitigation measures based solely on Port of Entry inspections may be inadequate in providing this security. However, the choice of appropriate sanitary and phytosanitary measures to mitigate risks associated with these pest species is undertaken as part of Risk Management, and is not addressed *per se*, in this document. Should additional pests, not identified in this Risk Assessment, be intercepted, appropriate quarantine action will be taken.

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Importation of Chinese Penjing

into the United States

With Particular Reference to *Ehretia microphylla*

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A. Introduction

This pest risk assessment (PRA) was conducted by the United States Department of Agriculture, Animal and Plant Health Inspection Service, Plant Protection and Quarantine, Biological Assessment and Taxonomic Support Staff (USDA, APHIS, PPQ, BATS) on *Ehretia (Carmona) microphylla* penjing, established in a growing medium, from China. The results are expressed qualitatively ("high" or "low"), rather than quantitatively (probabilities or frequencies). The risk assessment methodology and rating criteria can be found in the document *Pathway-Initiated Pest Risk Assessment: Guidelines for Qualitative Assessment* (USDA, 1995) (available from the authors of this risk assessment). Authority for APHIS to regulate plant pests/plant products is derived from the Plant Quarantine Act of 1912, the Plant Pest Act of 1957, the Noxious Weed Act of 1974 and the Code of Federal Regulations, Title 7, Part 319, Subpart 37 (7 CFR 319.37- Nursery Stock, Plants, Roots, Bulbs, Seeds and Other Plant Products). The methods and terminology used to initiate, conduct, and report this PRA are consistent with guidelines provided by FAO (1995) and NAPPO (1995).

B. Risk Assessment

1. Initiating Event: Proposed Action

China has been exporting significant volumes of bare root bonsai plants into the United States for a number of years. In August, 1992 representatives of the China Animal and Plant Quarantine Service (CAPQ), requested permission to export penjing (landscape bonsai) established in growing media. A list of 112 plant species was submitted. From these plants; categorized by PPQ, as prohibited, postentry, and restricted; CAPQ was asked in January, 1994, to select five restricted species. Subsequently, CAPQ submitted a list of eight species, along with a list of pests or potential pests of each species. In April 1994, the BATS Staff identified five species as candidates for pest risk assessments: *Buxus sinica* (Buxaceae), *Ehretia (Carmona) microphylla* (Boraginaceae), *Podocarpus macrophyllus* (Podocarpaceae), *Sageretia thea (theazans)* (Rhamnaceae), and *Serissa foetida* (Rubiaceae).

There are special concerns associated with propagative material in growing media: the presence of biological contaminants may not be discernible by visual inspection (this includes both pre shipment and Port of Entry inspections); the infeasibility of complete inspection greatly increases the potential of the introduction of exotic organisms; the treatment(s) of the growing media may not be entirely efficacious; the continual hazard of pest infestation/reinfestation of "clean" plants.

2. Assessment of Weediness Potential of *Ehretia* spp.

The results of the weediness screening for *Ehretia* (Table 1) did not prompt a pest-initiated risk assessment.

Table 1: Process for Determining Weediness Potential of Commodity

Commodity: *Ehretia* spp. (Boraginaceae)

Phase 1: The genus *Ehretia* consists of about 50 species of evergreen or deciduous shrubs and trees native to tropical and subtropical Old and New World. *Ehretia* is sometimes planted as an ornamental in the extreme southern United States. Some species provide timber (*E. acuminata*) R. BR.; some are used medicinally (*E. philippensis* A. DC).

Phase 2: Is the genus listed in:
NO *Geographical Atlas of World Weeds* (Holm et al., 1979)
NO *World's Worst Weeds* (Holm et al., 1977)
NO *Report of the Technical Committee to Evaluate Noxious Weeds; Exotic Weeds for Federal Noxious Weed Act* (Gunn & Ritchie, 1982)
NO *Economically Important Foreign Weeds* (Reed, 1977)
NO Weed Science Society of America list (WSSA, 1989)
NO Is there any literature reference indicating weediness, e.g., *AGRICOLA*, *CAB*, *Biological Abstracts*, *AGRIS*; search on "species name" combined with "weed").

Phase 3: Conclusion:

- IF:
1. The species is widely prevalent in the United States and the answer to all of the questions is **no...**
Proceed with the pest risk assessment.
 2. The species is widely prevalent in the United States and the answer to **one** or more of the questions is **yes...**
Proceed with the pest risk assessment, provide comments on findings in text, and incorporate findings regarding weediness into the Risk Elements described below.
 3. The species is new to or not widely prevalent in the United States and the answer to all of the questions is **no...**
Proceed with the pest risk assessment.
 4. The species is new to or not widely prevalent in the United States and the answer to **one or more** of the questions is **yes...**
Consult authority under the Federal Noxious Weed Act for listing plant species as a noxious weed and consider the advisability of performing a pest-initiated pest risk assessment on the plant species. Provide explanations of findings in text.

3. **Previous Risk Assessments, Current Status and Pest Interceptions**
Decision History for *Ehretia* spp. from China
 Currently enterable as bare root plants

Pest Interceptions on bare root *Ehretia* spp. from China - FY85-95

Bradybaena ravida(Benson) (Mollusca: Bradybaenidae)

Coccidae sp. (Homoptera)

Pseudaulacaspis sp. (Homoptera: Diaspididae)

4. **Pests associated with *Ehretia* spp. in China**

Table 2. Pests of <i>Ehretia</i>				
Scientific Name	Dist ¹	Host Genera ²	Codes ³	References
ARTHROPODA AND MOLLUSCA				
<i>Adoretus sinicus</i> Burmeister (Coleoptera: Scarabaeidae)	CN, HI	Poly. Camellia, Rosa, Diospyros, Frimiana, Theobroma, Morus, Abelmoschus, Vitis, Gossypium, Phaseolus, Populus	z(soil), h, n	China, 1995, INKTO No. 89; CFR 318.13
<i>Agrotis segetum</i> (D. & S.) (Lepidoptera: Noctuidae)	CN	Poly. Citrus, Malus, Olea, Vitis, Zea	n, z(soil)	China, 1995; Carter, 1984; INKTO No. 25.
<i>Aleurocanthus spiniferus</i> Quaintance (Homoptera: Aleyrodidae)	CN, HI	Poly. Ehretia, Citrus, Vitis, Pyrus, Rosa, Diospyros, Camellia, Gardenia, Paeonia, Cinnamomum, Salix,	n, z _c	China, 1994, 1995; CIE, 1976; INKTO No. 14; CFR 318.13
<i>Amphimallon solstitialis</i> (L.) (Coleoptera: Scarabaeidae)	CN	Poly. Pinus, Beta, Solanum	n, z(soil)	Browne, 1968; China, 1995; CIE, 1979; INKTO No. 99
<i>Anomala corpulenta</i> Motschulsky (Coleoptera: Scarabaeidae)	CN	Poly. Buxus, Juglans, Cunninghamia, Juniperus, Pinus, Malus, Prunus, Sabina, Salix, Ulmus, Vericia	z(soil)	China, 1994, 1995
<i>Anomala cupripes</i> Hope (Coleoptera: Scarabaeidae)	CN	Poly. Buxus, Ficus, Camellia, Delonix, Hevea, Dimocarpus,	z (soil)	China, 1994, 1995 Gordon, 1994

		Litchi, Mangifera		
<i>Aphis gossypii</i> Glover (Homoptera: Aphididae)	CN, US	Poly. <i>Ehretia</i> , <i>Sageretia</i> , <i>Serissa</i>	c, z _e	China, 1994; CIE, 1968; Wilson & Vickery, 1981; Patch, 1938; Smith & Parron, 1978
<i>Aphis</i> sp. (Homoptera: Aphididae)	CN	<i>Ehretia</i>	z _e	PPQ interception; China, 1995
<i>Aporia crataegi</i> L. (Lepidoptera: Pieridae)	CN	Poly. <i>Crataegus</i> , <i>Malus</i> , <i>Prunus</i> , <i>Pyrus</i> , <i>Salix</i> , <i>Ulmus</i>	n	INKTO No. 149; China, 1995; Anon., 1986
<i>Bradybaena ravida</i> (Benson) (Mollusca: Bradybaenidae)	CN	Poly. <i>Ehretia</i> , <i>Iris</i> , <i>Gardenia</i> , <i>Rosa</i> , <i>Cymbidium</i> , <i>Prunus</i> , <i>Chrysanthemum</i>	n, z(soil), z _e	PPQ interception; China, 1995; Likhachev & Rammel'meier, 1962
<i>Bradybaena similaris</i> (Ferussac) (Mollusca: Bradybaenidae)	CN, US	Poly. <i>Sageretia</i> , <i>Serissa</i>	c, z _e , z(soil)	China, 1994; Chang & Chen, 1989; Dundee, 1970; Yen 1943
<i>Chrysodeixis chalcites</i> (Esper) (Lepidoptera: Noctuidae)	CN	Poly. <i>Ficus</i> , <i>Coffea</i> , <i>Brassica</i> , <i>Cucumis</i> , <i>Cynara</i> , <i>Cucurbita</i> , <i>Echium</i> , <i>Utica</i> , <i>Glycine</i> , <i>Gossypium</i> , <i>Medicago</i> , <i>Trifolium</i> , <i>Lycopersicon</i> , <i>Salvia</i> , <i>Marrubium</i> , <i>Nicotiana</i> , <i>Phaseolus</i> , <i>Solanum</i> , <i>Zea</i>	n	CIE, 1977; China, 1995; Goodey, 1991; Taylor, 1980
<i>Conogethes punctiferalis</i> (Guenée) (Lepidoptera: Pyralidae)	CN	Poly. <i>Gossypium</i> , <i>Pinus</i> , <i>Helianthus</i> , <i>Prunus</i> , <i>Pyrus</i> , <i>Zea</i> , <i>Sorghum</i> , <i>Castanea</i>	n	INKTO; China, 1995
<i>Drosicha corpulenta</i> (Kuwana) (Homoptera: Margarodidae)	CN	Poly. <i>Buxus</i> , <i>Citrus</i> , <i>Ficus</i> , <i>Magnolia</i> , <i>Paulownia</i> , <i>Plantanus</i> , <i>Salix</i> , <i>Melia</i> , <i>Pyrus</i> , <i>Sophora</i> , <i>Quercus</i> , <i>Podocarpus</i> , <i>Prunus</i> , <i>Ziziphus</i> , <i>Diospyros</i> , <i>Malus</i> , <i>Castanea</i>	z (soil), z _e	China, 1994, 1995; Shiraki, 1952

<i>Gryllotalpa africans</i> Palisot de Beauvois (Orthoptera: Gryllotalpidae)	CN	Poly. Solanum, Pinus, Camellia, Saccharum, Gossypium, Fragaria, Dianthus, Prunus, Vitis, Fortunella, Nicotiana	n, z(soil)	INKTO No. 197; China, 1995
<i>Helicoverpa armigera</i> (Hübner) (Lepidoptera: Noctuidae)	CN	Poly. Glycine, Tagetes, Medicago, Gossypium, Solanum, Lycopersicon, Zea, Triticum, Nicotiana	n, z(soil)	CIE, 1993; China, 1995; Avidov & Harpaz, 1969
<i>Helicoverpa assulta</i> (Guenée) (Lepidoptera: Noctuidae)	CN	Poly. Capsicum, Cucumis, Gossypium, Ipomoea, Nicotiana, Sorghum, Zea	n, z(soil)	CIE, 1994; China, 1995
<i>Icerya aegyptica</i> (Douglas) (Homoptera: Margarodidae)	CN	Poly. Citrus, Ficus, Cinnamomum, Morus, Diospyros, Psidium, >100 hosts	n	INKTO No. 119; China, 1995; CIE, 1966; Williams, 1985
<i>Icerya purchasi</i> Maskell (Homoptera: Margarodidae)	CN, US	Poly. Buxus, Ehretia,	c, o, z _c	China, 1994, CIE, 1971; Myer, 1978; Salama, <i>et al</i> , 1985
<i>Icerya seychellarum</i> (Westwood) (Homoptera: Margarodidae)	CN	Poly. Sapium, Acer, Camellia, Citrus, Podocarpus, Psidium, Citrus, Pyrus, Prunus, Rosa, Cycas, Thea, Eriobotrya, Morus, Trachycarpus, >100 hosts	n	CIE, 1955; PNKTO No. 21; China, 1995
<i>Mamestra brassicae</i> (L.) (Lepidoptera: Noctuidae)	CN	Poly. Beta, Brassica, Daucus, Gossypium, Morus, Nicotiana, Pisum, Saccharum, Solanum, Triticum, Vicia	n, z(soil)	INKTO No. 61; China, 1995
<i>Myzus persicae</i> (Sulzer) (Homoptera: Aphididae)	CN, US	Poly. Buxus, Ehretia, Serissa	c, o, z _c	China, 1994; Blackman & Eastop, 1985; Zhang & Zhong, 1983
<i>Phyllophaga</i> sp. (Coleoptera: Scarabaeidae)	CN	Poly. Serissa	n, z(soil), z _c	PPQ interception; China, 1995
<i>Phyllophaga titanis</i> Reitter	CN	Poly. Buxus, Rosa,	z (soil)	China, 1995; Gordon,

(Coleoptera: Scarabaeidae)		Sophora, Ulmus		1994
<i>Rhizoecus hibisci</i> Kawai & Takagi (Homoptera: Pseudococcidae)	CN, HI,	Serissa, Cryptanthus, Rhaphis, Zelkova, Carex, Crinum, Cuphea, Sabal, Dieffenbachia, Nerium, Hakonechloa, Phoenix, Pelargonium, Hibiscus	z (soil)	EPPO, 1996a
<i>Saissetia</i> sp. (Homoptera: Coccidae)	CN	Ehretia	z _c	PPQ interception; China, 1995
<i>Spodoptera litura</i> (F.) (Lepidoptera: Noctuidae)	CN	Poly. Arachis, Beta, Brassica, Citrus, Glycine, Gossypium, Ipomoea, Morus, Nicotiana, Oryza, Solanum, Sorghum, Ulmus, Zea	n	INKTO No. 12; CIE, 1967; China, 1995
<i>Succinea</i> sp. (Mollusca: Succinidae)	CN	Ehretia, unknown	n, z _c	China, 1994, 1995
<i>Sympiezomias velatus</i> Chevrolat (Coleoptera: Curculionidae)	CN	Sophora, Populus, Morus, Glycine, Beta, Castanea, 70 genera, 101 species recorded.	z(soil), z _c	China, 1995
<i>Tetranychus kanzawai</i> Kishida (Acari: Tetranychidae)	CN	Poly. Ehretia, Prunus, Morus, Sophora, Salix, Lycium, Gardenia, Medicago, Cordyline, Cyathea, Manihot, Perilla, Vitis, Murraya, Phaseolus, Solanum, Tecton, Rosa, Camellia, Terminalia, Fragaria, Capsicum, Zea	z _c	Tseng, 1990; China, 1995; Kondo, <i>et al.</i> , 1987; Osakabe, 1967.
<i>Thrips palmi</i> Karny (Thysanoptera: Thripidae)	CN, FL, H I	Polyphagous	g, n	CIE, 1992; Smith, <i>et al.</i> , 1992.
<i>Tridactylus japonicus</i> de Hoan (Orthoptera: Trydactilidae)	CN	Buxus, Camellia, Rosa, Cedrus, Fragaria, Oryza, Gossypium, Nicotiana, Sabina, Saccharinum	z (soil), z _c	China, 1994, 1995; Shiraki, 1952
" <i>Austropelea allulua</i> " (?) (Lymnaeidae)	CN	Ehretia, unknown	unknown	China, 1994, 1995
" <i>Incilaria</i> sp." (?)	CN	Podocarpus, Serissa,	unknown	China, 1994, 1995

(Philomycidae)?		Ehretia, Unknown		
FUNGI				
<i>Dennisiella babingtonii</i> (Berk.) Batista & Cif. Anamorph: <i>Microxiphium fagi</i> (Pers.) S. J. Hughes Syn.: <i>Capnodium footii</i> Harvey ex Berk. & Desmaz., nom. illeg. (Loculoascomycetes, Dothideales)	CN, US	Buxus, Ehretia, Ilicium, Sageretia	o,Z _{ei}	China, 1992; Farr, <i>et al.</i> , 1989
<i>Macrophoma ehretiae</i> Cooke & Mass. (Fungi Imperfecti, Coelomycetes)	CN	Buxus, Ehretia	Z _{ei}	Anonymous, 1970; China 1995, Farr, 1989; Tai, 1979
<i>Pestalotia guepinii</i> (Desm.) Stey. (Fungi Imperfecti, Coelomycetes)	CN, US	Ehretia, Various genera	o,Z _{ei}	China, 1992
<i>Phakopsora ehretiae</i> Hirats. (Basidiomycetes, Uredinales)	CN	Ehretia	Z _{ei}	Farr, 1994; Spaulding, 1961; Tai, 1979
<i>Pseudocercospora ehretiae</i> (Sawada ex) Goh & Hsieh (Fungi Imperfecti, Hyphomycetes)	CN	Ehretia	Z _{ei}	Anonymous, 1970; Farr, 1994; Goh & Hsieh 1989
<i>Pseudocercospora ehretiae-thyrsiflora</i> Goh & Hsieh (Fungi Imperfecti, Hyphomycetes)	CN	Ehretia	Z _{ei}	Goh & Hsieh, 1989b; Farr, 1994
<i>Uncinula ehretiae</i> Keissl. (Ascomycetes, Erysiphales)	CN	Ehretia	Z _{ei}	Farr, 1994; Tai, 1979
<i>Uredo ehretiae</i> Barclay (Basidiomycetes, Uredinales)	CN	Ehretia	Z _{ei}	China, 1995; Farr, 1994; Spaulding, 1961; Tai, 1979
<i>Uredo garanbiensis</i> Hirats. & Hash. (Basidiomycetes, Uredinales)	CN	Ehretia	Z _{ei}	Anonymous, 1970; China 1995; Farr, 1994
NEMATODA				
<i>Aphelenchoides besseyi</i> Christie (Aphelenchoididae)	CN, US	Various genera	o,z(soil)	Anonymous, 1984; EPPO, 1996a
<i>Aphelenchus</i> sp.	CN	Unknown	z(soil)	EPPO, 1996a

(Aphelenchidae)				
<i>Criconemella</i> sp. (Criconematidae)	CN	Unknown	z(soil)	EPPO, 1996a
Dorylaimidae sp. (Dorylaimidae)	CN	Unknown	z(soil)	EPPO, 1996a
<i>Dorylaimus</i> sp. (Dorylaimidae)	CN	Unknown	z(soil)	EPPO, 1996b
<i>Helicotylenchus</i> sp. (Hoplolaimidae)	CN	Unknown	z(soil)	EPPO, 1996a; b
<i>Helicotylenchus dihystra</i> (Cobb) Sher (Hoplolaimidae)	CN, US	Various genera	o, z(soil)	Anonymous, 1984; EPPO, 1996a; b
<i>Hirschmanniella</i> sp. (Pratylenchidae)	CN	Unknown	z(soil)	EPPO, 1996a;b
<i>Meloidogyne</i> sp. (Heteroderidae)	CN	Unknown	z(soil)	EPPO, 1996b
<i>Paratrophorus</i> sp. (Belonolaimiidae)	CN	Unknown	z(soil)	EPPO, 1996a
<i>Pratylenchus brachyurus</i> (Godfrey) Filipjev & Schuurmans Stekhoven (Pratylenchidae)	CN, US	Various genera	o, z(soil)	Anonymous, 1984; EPPO, 1996b
<i>Pratylenchus</i> sp. (Pratylenchidae)	CN	Unknown	z(soil)	EPPO, 1996a; b
<i>Rotylenchus robustus</i> (deMan) Filipjev (Hoplolaimidae)	CN, US	Various genera	o, z(soil)	EPPO, 1996b
<i>Trichodorus</i> sp. (Trichodoridae)	CN	Unknown	z(soil)	EPPO, 1996a
<i>Tylenchorhynchus</i> sp. (Tylenchorhynchidae)	CN	Unknown	z(soil)	EPPO, 1996a
<i>Tylenchorhynchus crassicaudatus</i> Williams (Tylenchorhynchidae)	CN	Oryza	e, z(soil)	EPPO, 1996a; b
<i>Tylenchorhynchus leviterminalis</i> Siddiqi, Mukherjee & Dasgupta	CN	Unknown	z(soil)	EPPO, 1996a; b

(Tylenchorhynchidae)				
<i>Tylenchus</i> sp. (Tylenchidae)	CN	Unknown	z(soil)	EPPO, 1996a
<i>Xiphinema brasiliense</i> Lordello (Longidoridae)	CN, US (FL)	Unknown	o, z(soil)	EPPO, 1996b
<i>Xiphinema</i> sp. (Longidoridae)	CN	Unknown	z(soil)	EPPO, 1996a;b

¹Geographical distribution is denoted by the following abbreviations: CN -People's Republic of China, FL-Florida, HI-Hawaii, US-United States

²Host genera identified in literature and by CAPQ

³Codes: c - Listed in non-reportable dictionary as non-actionable.

e - Although pest attacks commodity, it would not be expected to remain with the commodity (plant part) during processing

g - Quarantine pest; pest has limited distribution in the U.S. and is under official control as follows: pest listed by name in USDA 's pest dictionary, official quarantine action may be taken on this pest when intercepted on this commodity.

h - Quarantine pest; pest has limited distribution in the U.S. and is under official control as follows: (1) pest listed by name in USDA 's pest dictionary, official quarantine action may be taken on this pest when intercepted on this commodity and, (2) pest is a program pest (there is an official Federal or recognized State program for control of this pest beyond its being listed in the pest dictionary as actionable.)

n - Listed in the USDA catalogue of intercepted pests as actionable.

o - Organism does not meet the geographical and regulatory definition for a quarantine pest.

z - Internal feeder: Pest is known to attack or infect commodity and it would be reasonable to expect the pest may remain with the commodity during processing and shipping

z - External feeder: Pest is known to commonly attack or infect commodity and it would be reasonable to expect the pest may remain with the commodity during processing and shipping.

5. List of Quarantine Pests

Table 3: Quarantine Pests

ARTHROPODA

- Adoretus sinicus* Burmeister (Coleoptera: Scarabaeidae)
Agrotis segetum (D. & S.) (Lepidoptera: Noctuidae)
Aleurocanthus spiniferus Quaintance (Homoptera: Aleyrodidae)
Amphimallon solstitialis (L.) (Coleoptera: Scarabaeidae)
Anomala corpulenta Motschulsky (Coleoptera: Scarabaeidae)
Anomala cupripes Hope (Coleoptera: Scarabaeidae)
Aporia crataegi L. (Lepidoptera: Pieridae)
Chrysodeixis chalcites (Esper) (Lepidoptera: Noctuidae)
Conogethes punctiferalis (Guenée) (Lepidoptera: Pyralidae)
Drosicha corpulenta (Kuwana) (Homoptera: Margarodidae)
Gryllotalpa africans Palisot de Beauvois (Orthoptera: Gryllotalpidae)
Helicoverpa armigera (Hübner) (Lepidoptera: Noctuidae)
Helicoverpa assulta (Guenée) (Lepidoptera: Noctuidae)
Icerya aegyptica (Douglas) (Homoptera: Margarodidae)
Icerya seychellarum (Westwood) (Homoptera: Margarodidae)
Mamestra brassicae (L.) (Lepidoptera: Noctuidae)
Phyllophaga titanis Reitter (Coleoptera: Scarabaeidae)
Rhizoecus hibisci Kawai & Takagi (Homoptera: Pseudococcidae)
Spodoptera litura (F.) (Lepidoptera: Noctuidae)
Sympiezomias velatus Chevrolat (Coleoptera: Curculionidae)
Tetranychus kanzawai Kishida (Acari: Tetranychidae)
Thrips palmi Karny (Thysanoptera: Thripidae)
Trydactylus japonicus de Hoan (Orthoptera: Trydactilidae)

MOLLUSCA

- Bradybaena ravida* (Benson) (Mollusca: Bradybaenidae)

UNKNOWN ORGANISMS

- "*Austropelea allulua*"
 "Incilaria" sp.

FUNGI

- Macrophoma ehretiae* Cooke & Mass. (Fungi Imperfecti, Coelomycetes)
Phakopsora ehretiae Hirats. (Basidiomycetes, Uredinales)
Pseudocercospora ehretiae (Sawada ex) Goh & Hsieh (Fungi Imperfecti, Hyphomycetes)
Pseudocercospora ehretiae-thyrsiflora Goh & Hsieh (Fungi Imperfecti, Hyphomycetes)
Uncinula ehretiae Keissl. (Ascomycetes, Erysiphales)
Uredo ehretiae Barclay (Basidiomycetes, Uredinales)
Uredo garanbiensis Hirats. & Hash. (Basidiomycetes, Uredinales)

NEMATODA

- Paratrophorus* sp. (Belonolaimiidae)
Tylenchorhynchus crassicaudatus Williams (Tylenchorhynchidae)
Tylenchorhynchus leviterminalis Siddiqi, Mukherjee & Dasgupta (Tylenchorhynchidae)

6. Quarantine Pests Likely to Follow Pathway

Table 4: Quarantine Pests Likely to Follow Pathway

ARTHROPODA

- Adoretus sinicus* Burmeister (Coleoptera: Scarabaeidae)
Agrotis segetum (D. & S.) (Lepidoptera: Noctuidae)
Aleurocanthus spiniferus Quaintance (Homoptera: Aleyrodidae)
Amphimallon solstitialis (L.) (Coleoptera: Scarabaeidae)
Anomala corpulenta Motschulsky (Coleoptera: Scarabaeidae)
Anomala cupripes Hope (Coleoptera: Scarabaeidae)
Drosicha corpulenta (Kuwana) (Homoptera: Margarodidae)
Gryllotalpa africans Palisot de Beauvois (Orthoptera: Gryllotalpidae)
Helicoverpa armigera (Hübner) (Lepidoptera: Noctuidae)
Helicoverpa assulta (Guenée) (Lepidoptera: Noctuidae)
Mamestra brassicae (L.) (Lepidoptera: Noctuidae)
Phyllophaga titanis Reitter (Coleoptera: Scarabaeidae)
Rhizoecus hibisci Kawai & Takagi (Homoptera: Pseudococcidae)
Sympiezomias velatus Chevrollet (Coleoptera: Curculionidae)
Tetranychus kanzawai Kishida (Acari: Tetranychidae)
Tridactylus japonicus de Hoan (Orthoptera: Trydactilidae)

MOLLUSCA

- Bradybaena ravida* (Benson) (Mollusca: Bradybaenidae)

UNKNOWN ORGANISMS

- "*Austropelea allulua*"
 "Incilaria" sp.

FUNGI

- Macrophoma ehretiae* Cooke & Mass. (Fungi Imperfecti, Coelomycetes)
Phakopsora ehretiae Hirats. (Basidiomycetes, Uredinales)
Pseudocercospora ehretiae (Sawada ex) Goh & Hsieh (Fungi Imperfecti, Hyphomycetes)
Pseudocercospora ehretiae-thyrsiflora Goh & Hsieh (Fungi Imperfecti, Hyphomycetes)
Uncinula ehretiae Keissl. (Ascomycetes, Erysiphales)
Uredo ehretiae Barclay (Basidiomycetes, Uredinales)

NEMATODA

- Paratrophorus* sp. (Belonolaimiidae)
Tylenchorhynchus crassicaudatus Williams (Tylenchorhynchidae)
Tylenchorhynchus leviterminalis Siddiqi, Mukherjee & Dasgupta (Tylenchorhynchidae)

Other organisms in this Assessment, not chosen for further scrutiny, may be potentially detrimental to the agricultural production systems of the United States. There were a variety of reasons for not subjecting them to further analysis: they may be associated with

the commodity (however, it was not considered reasonable to expect these pests to remain with the commodity during processing); they have been intercepted, as biological contaminants, by PPQ Officers during inspections and would not be expected to be found with every shipment.

7. Economic Importance: Consequences of Introduction

Pests rated for potential economic importance are evaluated against five biological factors. The cumulative score for these elements is the Risk Rating (USDA, 1995)

Table 5: Risk Rating - Consequences of Introduction

Pest	Climate/ Host	Host Range	Dispersal	Economic	Environ- mental	Risk Rating
<i>Adoretus sinicus</i>	H	H	H	M	M	H
<i>Agrotis segetum</i>	H	H	H	M	M	H
<i>Aleurocanthus spiniferus</i>	H	H	H	M	M	H
<i>Amphimallon solstitialis</i>	H	H	H	M	M	H
<i>Anomala corpulenta</i>	H	H	H	M	M	H
<i>Anomala cupripes</i>	H	H	H	M	M	H
<i>Drosicha corpulenta</i>	H	H	H	M	M	H
<i>Gryllotalpa africans</i>	H	H	H	M	M	H
<i>Helicoverpa armigera</i>	H	H	H	M	M	H
<i>Helicoverpa assulta</i>	H	H	H	M	M	H
<i>Mamestra brassicae</i>	H	H	H	M	M	H
<i>Phyllophaga</i>	H	H	H	M	M	H

<i>titanis</i>						
<i>Rhizoecus hibisci</i>	H	H	H	M	M	H
<i>Sympiezomias velatus</i>	H	H	H	M	M	H
<i>Tetranychus kanzawai</i>	H	H	H	M	M	H
<i>Tridactylus japonicus</i>	H	H	H	M	M	H
<i>Bradybaena ravidia</i>	H	H	H	M	M	H
<i>Austropelea allulua</i>	H	H	H	M	M	H
<i>Incilaria sp.</i>	H	H	H	M	M	H
<i>Macrophoma ehretiae</i>	H	H	H	M	M	H
<i>Phakopsora ehretiae</i>	H	L	H	M	M	M
<i>Pseudocercospora ehretiae</i>	H	L	H	M	M	M
<i>Pseudocercospora ehretiae-thyrsoflora</i>	H	L	H	M	M	M
<i>Uncinula ehretiae</i>	H	L	H	M	M	M
<i>Uredo ehretiae</i>	H	L	H	M	M	M
<i>Paratrophorus sp.</i>	H	M	H	M	M	H
<i>Tylenchorhynchus crassicaudatus</i>	H	M	H	M	M	H
<i>Tylenchorhynchus leviterminalis</i>	H	M	H	M	M	H

8. Likelihood of Introduction

The likelihood of introduction for a pest is rated relative to six factors (Tables 6 and 7) (USDA, 1995).

Number of 40' Containers Annually	Rating
10 - 100	M

Pest	Likelihood of surviving postharvest treatment	Likelihood of surviving shipment	Likelihood of not being detected at port of entry	Likelihood of moving to suitable habitat	Likelihood of finding suitable hosts	Risk Rating
<i>Adoretus sinicus</i>	H	H	H	H	H	H
<i>Agrotis segetum</i>	H	H	H	H	H	H
<i>Aleurocanthus spiniferus</i>	H	H	M	H	H	H
<i>Amphimallon solstitialis</i>	H	H	H	H	H	H
<i>Anomala corpulenta</i>	H	H	H	H	H	H
<i>Anomala cupripes</i>	H	H	H	H	H	H
<i>Drosicha corpulenta</i>	H	H	H	H	H	H
<i>Gryllotalpa africans</i>	H	H	H	H	H	H
<i>Helicoverpa armigera</i>	H	H	M	H	H	H
<i>Helicoverpa assulta</i>	H	H	M	H	H	H
<i>Mamestra brassicae</i>	H	H	M	H	H	H

<i>Phyllophaga titanis</i>	H	H	H	H	H	H
<i>Rhizoecus hibisci</i>	H	H	H	H	H	H
<i>Sympiezomias velatus</i>	H	H	H	H	H	H
<i>Tetranychus kanzawai</i>	H	H	H	H	H	H
<i>Tridactylus japonicus</i>	H	H	H	H	H	H
<i>Bradybaena ravidia</i>	H	H	H	H	H	H
<i>Austropelea allulua</i>	H	H	H	H	H	H
<i>Incilaria sp.</i>	H	H	H	H	H	H
<i>Macrophoma ehretiae</i>	H	H	M	H	H	H
<i>Phakopsora ehretiae</i>	H	H	M	H	H	H
<i>Pseudocercospora ehretiae</i>	H	H	M	H	H	H
<i>Pseudocercospora ehretiae-thyrsiflora</i>	H	H	M	H	H	H
<i>Uncinula ehretiae</i>	H	H	M	H	H	H
<i>Uredo ehretiae</i>	H	H	M	H	H	H
<i>Paratrophorus sp.</i>	H	H	H	H	H	H
<i>Tylenchorhynchus crassicaudatus</i>	H	H	H	H	H	H
<i>Tylenchorhynchus leviterminalis</i>	H	H	H	H	H	H

9. Pest Risk Potential

Pest Risk Potential is the combination of the consequences and likelihood of introductions (Tables 5, 6 and 7) (USDA, 1995).

Pest	Pest Risk Potential
<i>Adoretus sinicus</i>	H
<i>Agrotis segetum</i>	H
<i>Aleurocanthus spiniferus</i>	H
<i>Amphimallon solstitialis</i>	H
<i>Anomala corpulenta</i>	H
<i>Anomala cupripes</i>	H
<i>Austropelea allulua</i>	H
<i>Bradybaena ravida</i>	H
<i>Drosicha corpulenta</i>	H
<i>Gryllotalpa africans</i>	H
<i>Helicoverpa armigera</i>	H
<i>Helicoverpa assulta</i>	H
<i>Mamestra brassicae</i>	H
<i>Phyllophaga titanis</i>	H
<i>Rhizoecus hibisci</i>	H
<i>Sympiezomias velatus</i>	H
<i>Tetranychus kanzawai</i>	H
<i>Tridactylus japonicus</i>	H
<i>Macrophoma ehretiae</i>	H
<i>Phakopsora ehretiae</i>	H
<i>Pseudocercospora ehretiae</i>	H

<i>Pseudocercospora ehretiaethyrsiflora</i>	H
<i>Uncinula ehretiae</i>	H
<i>Uredo ehretiae</i>	H
<i>Paratrophorus</i> sp.	H
<i>Tylenchorhynchus crassicaudatus</i>	H
<i>Tylenchorhynchus leviterminalis</i>	H

Phytosanitary Measures

Numerous potential biological hazards are associated with the importation of propagative material in growing media. In the case of Chinese penjing, the plants are grown in the open, in proximity to the ground and in or around agricultural production areas. Other factors which exacerbate the pest risk are inadequate pest control, plants collected from the wild, the continual flow of plant material into and out of facilities and soil movement from adjacent agricultural areas. These conditions act in concert to produce a great potential for contaminants, pest organisms of plants from nature and windborne infestations to establish in the nursery stock.

From the perspective of this risk assessment, most of the organisms of concern (some arthropods, snails, nematodes and weed seeds) are soil inhabitants during at least one portion of their life histories. Other potential hazards include fungal fruiting bodies with a latent period. These organisms have a high Pest Risk Potential and will require specific measures to insure phytosanitary security. Accordingly, mitigation measures based solely on Port of Entry inspections will be inadequate in providing this security. However, the choice of appropriate sanitary and phytosanitary measures to mitigate risks associated with these pest species is undertaken as part of Risk Management, and is not addressed *per se*, in this document. Should additional pests, not identified in this Risk Assessment, be intercepted, appropriate quarantine action will be taken.

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Importation of Chinese Penjing

into the United States

With Particular Reference to *Podocarpus macrophyllus*

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A. Introduction

This pest risk assessment (PRA) was conducted by the United States Department of Agriculture, Animal and Plant Health Inspection Service, Plant Protection and Quarantine, Biological Assessment and Taxonomic Support Staff (USDA, APHIS, PPQ, BATS) on *Podocarpus macrophyllus* penjing, established in a growing medium, from China. The results are expressed qualitatively (“high” or “low”), rather than quantitatively (probabilities or frequencies). The risk assessment methodology and rating criteria can be found in the document: *Pathway-Initiated Pest Risk Assessment: Guidelines for Qualitative Assessments* (USDA, 1995) (available from the authors of this risk assessment). Authority for APHIS to regulate plant pests/plant products is derived from the Plant Quarantine Act of 1912, the Plant Pest Act of 1957, the Noxious Weed Act of 1974 and the Code of Federal Regulations, Title 7, Part 319, Subpart 37 (7 CFR 319.37 - Nursery Stock, Plants, Roots, Bulbs, Seeds and Other Plant Products). The methods and terminology used to initiate, conduct, and report this PRA are consistent with guidelines provided by FAO (1995) and NAPPO (1995).

B. Risk Assessment

1. Initiating Event: Proposed Action

China has been exporting significant volumes of bare root bonsai plants into the United States for a number of years. In August, 1992 representatives of the China Animal and Plant Quarantine Service (CAPQ), requested permission to export penjing (landscape bonsai) established in growing media. A list of 112 plant species was submitted. From these plants; categorized, by PPQ, as prohibited, postentry, and restricted; CAPQ was asked in January, 1994, to select five restricted species. Subsequently, CAPQ submitted a list of eight species, along with a list of pests or potential pests of each species. In April 1994, the BATS Staff identified five species as candidates for pest risk assessments: *Buxus sinica* (Buxaceae), *Ehretia (Carmona) microphylla* (Boraginaceae), *Podocarpus macrophyllus* (Podocarpaceae), *Sageretia thea (theazans)* (Rhamnaceae), and *Serissa foetida* (Rubiaceae).

There are special concerns associated with propagative material in growing media: the presence of biological contaminants may not be discernible by visual inspection (this includes both pre-shipment and Port of Entry inspections); the infeasibility of complete inspection greatly increases the potential of the introduction of exotic organisms; the treatment(s) of the growing media may not be entirely efficacious; the continual hazard of pest infestation/reinfestation of “clean” plants.

2. Assessment of Weediness Potential of *Podocarpus macrophyllus*.

The results of the weediness screening for *Ehretia* (Table 1) did not prompt a pest-initiated risk assessment.

Table 1: Process for Determining Weediness Potential of Commodity

Commodity: *Podocarpus spp.* (Podocarpaceae)

Phase 1: The genus *Podocarpus* consists of about 73 to 100 species of coniferous shrubs and trees, native to the temperate Southern Hemisphere and mountains and highlands of the tropics, north to the West Indies and Japan. Most species

may be grown outdoors in Zone 9 of the United States, or under glass as tub plants. Species grown in California include *P. gracilior* and *P. salignus*.

Phase 2: Is the genus listed in:

NO *Geographical Atlas of World Weeds* (Holm *et al.*, 1979)

NO *World's Worst Weeds* (Holm *et al.*, 1977)

NO *Report of the Technical Committee to Evaluate Noxious Weeds; Exotic Weeds for Federal Noxious Weed Act* (Gunn & Ritchie, 1982)

NO *Economically Important Foreign Weeds* (Reed, 1977)

NO Weed Science Society of America list (WSSA, 1989)

NO Is there any literature reference indicating weediness, *e.g.*, *AGRICOLA*, *CAB*, *Biological Abstracts*, *AGRIS*; search on "species name" combined with "weed".

Phase 3: Conclusion:

IF: 1. The species is widely prevalent in the United States and the answer to all of the questions is **no**...

Proceed with the pest risk assessment.

2. The species is widely prevalent in the United States and the answer to **one** or more of the questions is **yes**...

Proceed with the pest risk assessment, provide comments on findings in text, and incorporate findings regarding weediness into the Risk Elements described below.

3. The species is new to or not widely prevalent in the United States and the answer to all of the questions is **no**...

Proceed with the pest risk assessment.

4. The species is new to or not widely prevalent in the United States and the answer to **one or more** of the questions is **yes**...

Consult authority under the Federal Noxious Weed Act for listing plant species as a noxious weed and consider the advisability of performing a pest-initiated pest risk assessment on the plant species. Provide explanations of findings in text.

3. Previous Risk Assessments, Current Status and Pest Interceptions Decision History for *Podocarpus* spp. from China None

Pest Interceptions on *Podocarpus* from China - FY85-95 *Pestalotiopsis* sp.

4. Pests associated with *Podocarpus* spp. in China

ARTHROPODA and MOLLUSCA				
Scientific name	Dist.	Host Genera	Codes	References
<i>Adoretus sinicus</i> Burmeister (Coleoptera: Scarabaeidae)	CN, HI	Poly. Camellia, Diospyros, Rosa Frimiana, Vitis, Morus, Theobroma, Abelmoschus, Gossypium, Phaseolus, Asparagus, Populus	h, n, z(soil)	China, 1995; CFR 318.13; INKTO, No. 89
<i>Agrotis segetum</i> (D. & S.) (Lepidoptera: Noctuidae)	CN	Poly., Citrus, Malus, Olea, Vitis, Zea	n, z(soil)	Carter, 1984; China, 1995; INKTO, No. 25
<i>Amphimallon solstitialis</i> (L.) (Coleoptera: Scarabaeidae)	CN	Poly., Pinus, Beta, Solanum	n, z(soil)	Browne, 1968; China, 1995; CIE, 1979; INKTO No. 99
<i>Anomala corpulenta</i> Motschulsky (Coleoptera: Scarabaeidae)	CN	Poly. Buxus, Cunninghamia, Julans, Pinus, Malus, Juniperus, Prunus, Sabina, Salix, Ulmus, Vericia	z (soil)	China, 1994, 1995
<i>Anomala cupripes</i> Hope (Coleoptera: Scarabaeidae)	CN	Poly., Buxus, Camellia, Delonix, Ficus, Dimocarpus, Hevea, Litchi, Mangifera	z (soil)	China, 1994, 1995 Gordon, 1994
<i>Aonidiella aurantii</i> (Maskell) (Homoptera: Diaspididae)	CN, US	Poly., Buxus, Podocarpus, Citrus, Persea	c, z	China, 1994; CIE, 1968a; Dekle, 1965; Li and Liao, 1990; Nakahara, 1982
<i>Aonidiella taxus</i> Leonardi (Homoptera: Coccidae)	CN, US	Cephalotaxus, Podocarpus, Taxus	c, z	China, 1994; Dekle, 1965; Nakahara, 1982
<i>Aphis gossypii</i> Glover (Homoptera: Aphididae)	CN, US	Polyphagous	c	China, 1995; CIE, 1968b
<i>Aporia crataegi</i> L. (Lepidoptera: Pieridae)	CN	Poly., Crataegus, Malus, Prunus, Pyrus, Salix, Ulmus	n	Anonymous, 1972, 1986 China, 1995; INKTO, No. 149
<i>Archips oporana</i> (L.) (Lepidoptera: Tortricidae)	CN	Pinus, Abies, Podocarpus, Juniperus	z	China, 1994, 1995; Bradley <i>et al.</i> , 1973

<i>Bradybaena ravida</i> (Benson) (Mollusca: Bradybaenidae)	CN	Poly. Ehretia, Iris, Rosa, Chrysanthemum, Prunus, Gardenia, Cymbidium, Iris	n, z(soil), z	China, 1995; PPQ interception; Likhachev and Rammel'meier, 1962
<i>Bradybaena similaris</i> (Ferussac) (Mollusca: Bradybaenidae)	CN, US	Poly., Sageretia, Serissa	c, z, z(soil)	Chang and Chen, 1989; China, 1994; Dundee, 1970; Yen 1943
<i>Brevipalpus obovatus</i> Donnadieu (Acarina: Tenuipalpidae)	CN, US	Poly., Podocarpus	c, z	China, 1994; Jeppson, <i>et al.</i> , 1975
<i>Ceroplastes japonicus</i> Green (Homoptera: Coccidae)	CN	Poly. Buxus, Camellia, Malus, Gardenia, Prunus, Morus, Podocarpus, Magnolia, Citrus, Pyrus, Michelia	n, z	China, 1994, 1995; Gimpel, 1974; Kozar, <i>et al.</i> , 1984
<i>Ceroplastes pseudoceriferus</i> Green (Homoptera: Coccidae)	CN	Poly. Podocarpus, Camellia, Diospyros, Ulmus, Salix, Punica, Buxus, Gardenia, Rosa, Ilex, Nandina, Cedrus, Chaenomeles,, Morus, Citrus, Magnolia, Cycas, Litchi, Mangifera, Rosaceae	z	China, 1994, 1995; Park <i>et al.</i> , 1990
<i>Ceroplastes rubens</i> Maskell (Homoptera: Coccidae)	CN, FL, HI	Poly. Podocarpus, Citrus, Persea, Gardenia, Pinus, Aglaonema, Viburnum, Brassaia, Aralia	g, z	China, 1994, 1995; Hamon and Williams, 1984
<i>Chrysomphalus dictyospermi</i> (Morgan) (Homoptera: Diaspididae)	CN, US	Poly. Buxus, Podocarpus	c	China, 1994; CIE, 1969; Dekle, 1965; Garonna and Viggiani, 1989; Johnson and Lyon, 1982; Nakahara, 1982
<i>Chrysomphalus aonidum</i> L. (Homoptera: Diaspididae)	CN, US	Poly. Podocarpus	c, m	CIE, 1988a; Dekle, 1965
<i>Clania minuscula</i> Butler (Lepidoptera: Psychidae)	CN	Poly. Buxus, Acer, Bischofia, Camellia, Cupressus, Pinus, Lagerstroemia, Platanus, Punica, Salix, Sapium, Rosa, Ulmus, Pyrus, Prunus, Salix, Podocarpus, Vitis, Malus, Morus, Citrus, Thea, Pyrus, Ribes, Rubus, Castanea, Quercus, Populus, Fraxinus, Magnolia	z	China, 1994, 1995; Kozhanchikov 1956; Shiraki, 1952
<i>Coccus hesperidum</i> L. (Homoptera: Coccidae)	CN, US	Poly. Podocarpus, Pinus, Acacia, Citrus, Carica, etc.	c, z	Browne, 1968; CIE, 1972; Hamon and Williams, 1984

<i>Coccus longulus</i> (Douglas) (Homoptera: Coccidae)	CN, US	Poly. Podocarpus, Leucaena, Spathiphyllum, Anthurium, Myrica, Citrus	c, z	Chang, <i>et al.</i> , 1982; Hamon and Williams, 1984
<i>Conogethes punctiferalis</i> (Guenée) (Lepidoptera: Pyralidae)	CN	Poly. Gossypium, Helianthus, Pinus, Prunus, Pyrus, Sorghum, Zea, Castanea	n	China, 1995; INKTO
<i>Cryptothelea variegata</i> Snellen (Lepidoptera: Psychidae)	CN	Pinus, Pyracantha, Rosa, Buxus, Malus, Podocarpus, Gingko, Ulmus	z	China, 1994
<i>Cryptotympana pustulata</i> (F.) (Homoptera: Cicadidae)	CN	Podocarpus, Citrus, Pyrus, Morus, Salix, Populus	z (soil) z (oviposition)	China, 1994, 1995; Shiraki, 1952
<i>Dioryctia splendidella</i> Herring-Schaeffer (Lepidoptera: Pyralidae)	CN	Pinus, Podocarpus	z	China, 1994, 1995 Hirose and Nozato, 1975; Zelenev, 1980
<i>Drosicha corpulenta</i> (Kuwana) (Homoptera: Margarodidae)	CN	Poly. Buxus, Magnolia, Paulownia, Plantanus, Salix, Melia, Sophora, Podocarpus, Ziziphus, Diospyros, Malus, Pyrus, Citrus, Prunus, Ficus, Castanea, Quercus	z (soil)	China, 1994, 1995; Shiraki, 1952
<i>Fiorinia fioriniae</i> (Targioni-Tozzetti) (Homoptera: Diaspididae)	CN, US	Poly. Podocarpus	c, m	Johnson and Lyon, 1988; Nakahara, 1982
<i>Fiorinia japonica</i> (Kuwana) (Homoptera: Diaspididae)	CN, US	Poly. Podocarpus, Abies, Cedrus, Juniperus, Picea, Pinus, Taxus, Tsuga	c, z	China, 1994; Johnson and Lyon, 1988; Nakahara, 1982;
<i>Gryllotalpa africans</i> Palisot de Beauvois (Orthoptera: Gryllotalpidae)	CN	Poly. Solanum, Saccharum, Gossypium, Vitis, Fragaria, Camellia, Dianthus, Prunus, Fortunella, Pinus, Nicotiana	n, z (soil)	China, 1995; INKTO No. 197
<i>Gypsonoma minutana</i> Hübner (Lepidoptera: Tortricidae)	CN	Podocarpus, Populus, Salix	z	China, 1994, 1995; Doganlar and Doken 1985; Giunchi and de Giovanni, 1987
<i>Helicoverpa armigera</i> (Hübner) (Lepidoptera: Noctuidae)	CN	Poly. Glycine, Gossypium, Lycopersicon, Medicago, Nicotiana, Solanum, Tagetes, Triticum, Zea	n, z(soil)	Avidov and Harpaz, 1969; China, 1995; CIE, 1993a
<i>Helicoverpa assulta</i> (Guenée) (Lepidoptera: Noctuidae)	CN	Poly. Capsicum, Cucumis, Gossypium, Ipomoea, Nicotiana, Sorghum, Zea	n, z(soil)	China, 1995; CIE, 1994

<i>Homona coffearia</i> Nietner (Lepidoptera: Psychidae)	CN	Poly. Podocarpus, Malus, Pyrus, Prunus, Citrus, Vitis, Fragaria, Cinnamomum, Eucalyptus, Vigna, Litchi, Morus, Camellia, Averrhoa	z	Browne, 1968; China, 1994, 1995; Shiraki, 1952; Rejesus and Banasihan, 1978; Shiraki, 1952
<i>Homona magnanima</i> Diakonoff (Lepidoptera: Tortricidae)	CN	Pyrus, Podocarpus, Camellia, Rosa, Prunus, Pinus, Abies, Ligustrum, Punica	z	China, 1994, 1995; Kobayashi, <i>et al</i> , 1988; Kanoh, <i>et al</i> , 1983
<i>Icerya aegyptica</i> (Douglas) (Homoptera: Margarodidae)	CN	Poly. Citrus, Cinnamomum, Diospyros, Ficus, Morus, Psidium, >100 hosts	n	China, 1995; CIE, 1966; INKTO, No. 119; Willians, 1985
<i>Icerya seychellarum</i> (Westwood) (Homoptera: Margarodidae)	CN	Poly. Sapium, Camellia, Acer, Podocarpus, Psidium, Citrus, Pyrus, Prunus, Rosa, Cycas, Eriobotrya, Morus, Trachycarpus, Thea, >100 hosts	n	CIE, 1955; China, 1995; PNKTO, No. 21
<i>Lepidosaphes gloverii</i> (Packard) (Homoptera: Diaspididae)	CN, US	Poly. Podocarpus, Citrus, Morus, Ligustrum, Magnolia, Hedera, Prunus	c, m	Dekle, 1965; Nakahara, 1982
<i>Lepidosaphes pallida</i> (Maskell) (Homoptera: Diaspididae)	CN, US	Poly. Podocarpus, Picea, Cephalotaxus, Sequoia, Chamaecyparis, Cryptomeria, Cupressus, Juniperus, Taxodium, Taxus, Thuya	c, z	China, 1994; Nakahara, 1982
<i>Lepidosaphes pini</i> (Maskell) (Homoptera: Diaspididae)	CN, MD, PA, HI	Podocarpus, Pinus, Abies	g, n, z	China 1994; Nakahara 1982
<i>Mamestra brassicae</i> (L.) (Lepidoptera: Noctuidae)	CN	Poly. Beta, Brassica, Daucus, Gossypium, Morus, Vicia, Nicotiana, Pisum, Saccharum, Solanum, Triticum	n, z(soil)	China, 1995; INKTO, No. 61
<i>Neophylaphis podicarp</i> Takahashi (Homoptera: Aphididae)	CN, US	Podocarpus	f, z	China 1994; Shiraki, 1952; Johnson Y Lyon, 1988.
<i>Paralepidosaphes tubulorum</i> (Ferris) (Homoptera: Diaspididae)	CN	Poly. Podocarpus, Betula, Rhododendron, Ribes, Pyrus, Malus, Prunus, Votos, Ficus, Diospyruos, Salix	z	China, 1994; Shiraki, 1952
<i>Parlatoria pergandii</i> Comstock (Homoptera: Diaspididae)	CN, US	Poly. Podocarpus, Citrus, Ilex	c, z	China, 1994; Dekle, 1965; Nakahara, 1982
<i>Parlatoria proteus</i> (Curtis) (Homoptera: Diaspididae)	CN, US	Poly. Podocarpus, Brassia, Calophyllum, Vanda, Phoenix	c, z	China, 1994; Nakahara, 1982

<i>Phenacoccus cockerelli</i> (Cooley) (Homoptera: Diaspididae)	CN, US	Poly., Podocarpus, Magnolia, Nerium, Gardenia	c, m	Dekle, 1965; Nakahara, 1982
<i>Phyllophaga</i> sp. (Coleoptera: Scarabaeidae)	CN	Poly. Serissa	n,z(soil), z	China, 1995; PPQ interception
<i>Phyllophaga titanis</i> Reitter (Coleoptera: Scarabaeidae)	CN	Poly. Buxus, Rosa, Sophora, Ulmus	z (soil)	China, 1995; Gordon, 1994
<i>Quadraspidiotus perniciosus</i> (Comstock) (Homoptera: Diaspididae)	CN, US	Poly. Podocarpus, Malus, Pyrus, Prunus, Rosaceae, Citrus	c, z	China, 1994; Nakahara, 1982
<i>Spodoptera litura</i> (F.) (Lepidoptera: Noctuidae)	CN	Poly. Arachis, Beta, Brassica, Citrus, Glycine, Gossypium, Ipomoea, Morus, Nicotiana, Oryza, Solanum, Sorghum, Ulmus, Zea	n	CIE, 1993b; China, 1995; INKTO, No. 12
<i>Sympiezomias velatus</i> Chevrolet (Coleoptera: Curculionidae)	CN	Sophora, Populus, Morus, Glycine, Beta, Castanea, 70 genera, 101 species recorded.	z(soil)	China, 1995
<i>Thrips palmi</i> Karny (Thysanoptera: Thripidae)	CN,FL, HI	Polyphagous	g, n	CIE, 1992; Smith <i>et al.</i> 1992
<i>Tridactylus japonicus</i> de Hoan (Orthoptera: Trydactilidae)	CN	Buxus, Camellia, Cedrus, Fragaria, Gossypium, Oryza Nicotiana, Rosa, Sabina, Saccharinum	z (root)	China, 1994, 1995; Shiraki, 1952
<i>Unaspis yanonensis</i> (Kuwana) (Homoptera: Diaspididae)	CN	Buxus, Citrus, Camellia, Punica, Osmanthus, Prunus, Podocarpus	n, z	China, 1994, 1995; PNKTO, No. 45; CIE, 1988b; Reu <i>et al.</i> , 1990; Tanaka, 1981
" <i>Calyptozele</i> sp." (?) Unknown	CN	Podocarpus, unknown	unknown	China, 1994, 1995
" <i>Incilaria</i> sp." (?) Unknown	CN	Podocarpus, Serissa, Unknown	Unknown	China, 1994, 1995
BACTERIA				
<i>Agrobacterium tumefaciens</i> (Smith & Townsend) Conn (Rhizobiaceae)	CN, US	Podocarpus, Various genera	o, z _e	Bradbury, 1986
FUNGI				
<i>Pestalospaeria jinggangensis</i> P.L. Zhu, Ge, & T. Xu (Pyrenomycetes, Amphisphaeriales)	CN	Podocarpus	z _e	Farr, 1994; Zuh <i>et al.</i> , 1991a; b

<i>Pestalotia diospyri</i> Sydow (Fungi Imperfecti, Coelomycetes)	CN (not on Podocar pus)	Diospyros	Z _{ei}	Anonymous, 1986; Farr <i>et al.</i> 1989; Tai, 1979
<i>Pestalotia foedans</i> Sacc. & Ellis (Fungi Imperfecti, Coelomycetes)	CN, US	Pinus, Podocarpus	o, Z _{ei}	Farr, <i>et al.</i> , 1989; Tai, 1979
<i>Pestalotia zahlbruckneriana</i> Henn. (Fungi Imperfecti, Coelomycetes)	CN, US	Acer, Podocarpus	o, Z _{ei}	Farr, <i>et al.</i> 1989; Tai, 1979
<i>Pestalotiopsis funerea</i> (Desmaz.) Steyaert (Fungi Imperfecti, Coelomycetes)	CN, US	Podocarpus Various genera	o, Z _{ei}	China, 1992; Farr <i>et al.</i> , 1989
<i>Phellinus noxius</i> (Corner) G. Cunn. (Basidiomycetes, Aphyllphorales)	CN	Podocarpus Various genera	Z _{ei} , (soil)	Chang, 1995; Farr, <i>et al.</i> 1989
<i>Phyllosticta nandinae</i> Tassi (Fungi Imperfecti, Coelomycetes)	CN, US	Nandina, Podocarpus	o, Z _{ei}	China, 1992; Farr, <i>et al.</i> , 1989
<i>Pseudomassaria carolinensis</i> Barr & C. S. Hodges Anamorph: <i>Beltraniella portoricensis</i> (F. Stevens) Pirozynski & S. D. Patil (Pyrenomycetes, Amphisphaeriales)	CN, US	Eucalyptus, Podocarpus	o, Z _{ei}	Farr <i>et al.</i> , 1989; Farr, 1994; Matsushima, 1980
<i>Pythium aphanidermatum</i> (Edson) Fitzp. (Oomycetes, Peronosporales)	CN, US	Podocarpus Various genera	o, Z _{ei} (soil)	China, 1992; Farr, <i>et al.</i> , 1989
<i>Sphaerella podocarpi</i> Cooke (Loculoascomycetes, Dothideales)	CN	Podocarpus	Z _{ei}	Farr, <i>et al.</i> , 1989; Tai, 1979
<i>Zygosporium masonii</i> S. J. Hughes (Fungi Imperfecti, Hyphomycetes)	CN, US	Juncus, Magnolia	o, Z _{ei}	Farr <i>et al.</i> , 1989; Matsushima, 1980
NEMATODA				

<i>Aphelenchoides besseyi</i> Christie (Aphelenchoididae)	CN, US	Various genera	o, z(soil)	Anonymous, 1984; EPPO, 1996a
<i>Aphelenchus</i> sp. (Aphelenchidae)	CN	Unknown	z(soil)	EPPO, 1996a
<i>Criconemella</i> sp. (Criconematidae)	CN	Unknown	z(soil)	EPPO, 1996a
<i>Dorylaimidae</i> sp. (Dorylaimidae)	CN	Unknown	z(soil)	EPPO, 1996a
<i>Dorylaimus</i> sp. (Dorylaimidae)	CN	Unknown	z(soil)	EPPO, 1996b
<i>Helicotylenchus</i> sp. (Hoplolaimidae)	CN	Unknown	z(soil)	EPPO, 1996a; b
<i>Helicotylenchus dihystra</i> (Cobb) Sher (Hoplolaimidae)	CN, US	Various genera	o, z(soil)	Anonymous, 1984; EPPO, 1996a; b
<i>Hirschmanniella</i> sp. (Pratylenchidae)	CN	Unknown	z(soil)	EPPO, 1996a; b
<i>Meloidogyne</i> sp. (Heteroderidae)	CN	Unknown	z(soil)	EPPO, 1996b
<i>Paratrophorus</i> sp. (Belonolaimiidae)	CN	Unknown	z(soil)	EPPO, 1996a
<i>Pratylenchus brachyurus</i> (Godfrey) Filipjev & Schuurmans Stekhoven (Pratylenchidae)	CN, US	Various genera	o, z(soil)	Anonymous, 1984; EPPO, 1996b
<i>Pratylenchus</i> sp. (Pratylenchidae)	CN	Unknown	z(soil)	EPPO, 1996a; b
<i>Rotylenchus robustus</i> (deMan) Filipjev (Hoplolaimidae)	CN, US	Various genera	o, z(soil)	EPPO, 1996b
<i>Trichodorus</i> sp. (Trichodoridae)	CN	Unknown	z(soil)	EPPO, 1996a
<i>Tylenchorhynchus</i> sp. (Tylenchorhynchidae)	CN	Unknown	z(soil)	EPPO, 1996a
<i>Tylenchorhynchus</i> <i>crassicaudatus</i> Williams (Tylenchorhynchidae)	CN	Oryza	z(soil)	EPPO, 1996a; b

<i>Tylenchorhynchus leviterminalis</i> Siddiqi, Mukherjee & Dasgupta (Tylenchorhynchidae)	CN	Unknown	z(soil)	EPPO, 1996a; b
<i>Tylenchus</i> sp. (Tylenchidae)	CN	Unknown	z(soil)	EPPO, 1996a
<i>Xiphinema brasiliense</i> Lordello (Longidoridae)	CN, US (FL)	Unknown	o, z(soil)	EPPO, 1996b
<i>Xiphinema</i> sp. (Longidoridae)	CN	Unknown	z(soil)	EPPO, 1996a;b

¹Codes: c - Listed in non-reportable dictionary as non-actionable.

f - Pest occurs in the U.S. and is not subject to official restrictions and regulations (*i.e.* not listed as actionable, and no official control program)

g- Quarantine pest; pest has limited distribution in the U.S. and is under official control as follows: pest listed by name in USDA's pest dictionary, official quarantine action may be taken on this pest when intercepted on this commodity.

h- Quarantine pest; pest has limited distribution in the U.S. and is under official control as follows:(1) pest listed by name in USDA's pest dictionary, official quarantine action may be taken on this pest when intercepted on this commodity and, (2) pest is a program pest (there is an official Federal or recognized State program for control of this pest beyond its being listed in the pest dictionary as actionable.)

m- the pest occurs within the PRA area and has been reported to attack the specified host species in other geographic regions; but has not been reported to attack the specified host species in the PRA area.

n- Listed in the USDA catalogue of intercepted pests as actionable.

z₁ - Internal feeder: Pest is known to attack or infect commodity and it would be reasonable to expect the pest may remain with the commodity during processing and shipping

z₂ - External feeder: Pest is known to commonly attack or infect commodity and it would be reasonable to expect the pest may remain with the commodity during processing and shipping.

5. List of Quarantine Pests

Table 3: Quarantine Pests - *Podocarpus*

ARTHROPODA

- Adoretus sinicus* Burmeister (Coleoptera: Scarabaeidae)
Agrotis segetum (D. & S.) (Lepidoptera: Noctuidae)
Amphimallon solstitialis (L.) (Coleoptera: Scarabaeidae)
Anomala corpulenta Motschulsky (Coleoptera: Scarabaeidae)
Anomala cupripes Hope (Coleoptera: Scarabaeidae)
Aporia crataegi L. (Lepidoptera: Pieridae)
Archips oporana (L.) (Lepidoptera: Tortricidae)
Ceroplastes japonicus Green (Homoptera: Coccidae)
Ceroplastes pseudoceriferus Green (Homoptera: Coccidae)
Ceroplastes rubens Maskell (Homoptera: Coccidae)
Clania minuscula Butler (Lepidoptera: Psychidae)
Conogethes punctiferalis (Guenée) (Lepidoptera: Pyralidae)
Cryptothelea variegata Snellen (Lepidoptera: Psychidae)
Cryptotympana pustulata (F.) (Homoptera: Cicadidae)
Dioryctia splendidella Herring-Schaeffer (Lepidoptera: Pyralidae)
Drosicha corpulenta (Kuwana) (Homoptera: Margarodidae)
Gryllotalpa africans Palisot de Beauvois (Orthoptera: Gryllotalpidae)
Gypsonoma minutana (Hubner) (Lepidoptera: Tortricidae)
Helicoverpa armigera (Hübner) (Lepidoptera: Noctuidae)
Helicoverpa assulta (Guenée) (Lepidoptera: Noctuidae)
Homona coffearia Nietner (Lepidoptera: Psychidae)
Homona magnanima Diakonoff (Lepidoptera: Psychidae)
Icerya aegyptica (Douglas) (Homoptera: Margarodidae)
Icerya seychellarum (Westwood) (Homoptera: Margarodidae)
Lepidosaphes pini (Maskell) (Homoptera: Diaspididae)
Mamestra brassicae (L.) (Lepidoptera: Noctuidae)
Paralepidosaphes tubulorum (Ferris) (Homoptera: Diaspididae)
Phyllophaga titanis Reitter (Coleoptera: Scarabaeidae)
Spodoptera litura (F.) (Lepidoptera: Noctuidae)
Sympiezomias velatus Chevrollet (Coleoptera: Curculionidae)
Thrips palmi Karny (Thysanoptera: Thripidae)
Tridactylus japonicus de Hoan (Orthoptera: Trydactilidae)
Unaspis yanonensis (Kuwana) (Homoptera: Diaspididae)

MOLLUSCA

- Bradybaena ravida* (Benson) (Mollusca: Bradybaenidae)

UNKNOWN

- "Calyptozele" sp.
 "Incilaria" sp.

FUNGI

- Pestalospaeria jinggangensis* P.L. Zhu, Ge, & T. Xu (Pyrenomycetes, Amphisphaeriales)
Pestalotia diospyri Sydow (Fungi Imperfecti, Coelomycetes)
Phellinus noxius (Corner) G. Cunn. (Basidiomycetes, Aphyllophorales)
Sphaerella podocarpi Cooke (Loculoascomycetes, Dothideales)

NEMATODA

- Paratrophorus* sp. (Belonolaimiidae)
Tylenchorhynchus crassicaudatus Williams (Tylenchorhynchidae)
Tylenchorhynchus leviterminalis Siddiqi, Mukherjee & Dasgupta (Tylenchorhynchidae)

6. Quarantine Pests Likely to Follow Pathway

Table 4: Quarantine Pests Likely to Follow Pathway

ARTHROPODA

- Adoretus sinicus* Burmeister (Coleoptera: Scarabaeidae)
Agrotis segetum (D. & S.) (Lepidoptera: Noctuidae)
Amphimallon solstitialis (L.) (Coleoptera: Scarabaeidae)
Anomala corpulenta Motschulsky (Coleoptera: Scarabaeidae)
Anomala cupripes Hope (Coleoptera: Scarabaeidae)
Archips oporana (L.) (Lepidoptera: Tortricidae)
Ceroplastes japonicus Green (Homoptera: Coccidae)
Ceroplastes pseudoceriferus Green (Homoptera: Coccidae)
Ceroplastes rubens Maskell (Homoptera: Coccidae)
Clania minuscula Butler (Lepidoptera: Psychidae)
Cryptothelea variegata Snellen (Lepidoptera: Psychidae)
Cryptotympana pustulata (F.) (Homoptera: Cicadidae)
Dioryctia splendidella Herring-Schaeffer (Lepidoptera: Pyralidae)
Drosicha corpulenta (Kuwana) (Homoptera: Margarodidae)
Gryllotalpa africans Palisot de Beauvois (Orthoptera: Gryllotalpidae)
Gypsonoma minutana (Hubner) (Lepidoptera: Tortricidae)
Helicoverpa armigera (Hübner) (Lepidoptera: Noctuidae)
Helicoverpa assulta (Guenée) (Lepidoptera: Noctuidae)
Homona coffearia Nietner (Lepidoptera: Psychidae)
Homona magnanima Diakonoff (Lepidoptera: Psychidae)
Icerya seychellarum (Westwood) (Homoptera: Margarodidae)
Lepidosaphes pini (Maskell) (Homoptera: Diaspididae)
Mamestra brassicae (L.) (Lepidoptera: Noctuidae)
Paralepidosaphes tubulorum (Ferris) (Homoptera: Diaspididae)
Phyllophaga titanis Reitter (Coleoptera: Scarabaeidae)
Sympiezomias velatus Chevrollet (Coleoptera: Curculionidae)
Thrips palmi Karny (Thysanoptera: Thripidae)
Tridactylus japonicus de Hoan (Orthoptera: Trydactylidae)

MOLLUSCA*Bradybaena ravida* (Benson) (Mollusca: Bradybaenidae)**UNKNOWN**

"Calypsozele" sp.

"Incilaria" sp.

FUNGI*Pestalospaeria jinggangensis* P.L. Zhu, Ge, & T. Xu (Pyrenomycetes, Amphisphaeriales)*Pestalotia diospyri* Sydow (Fungi Imperfecti, Coelomycetes)*Phellinus noxius* (Corner) G. Cunn. (Basidiomycetes, Aphyllophorales)*Sphaerella podocarpi* Cooke (Loculoascomycetes, Dothideales)**NEMATODA***Paratrophorus* sp. (Belonolaimiidae)*Tylenchorhynchus crassicaudatus* Williams (Tylenchorhynchidae)*Tylenchorhynchus leviterminalis* Siddiqi, Mukherjee & Dasgupta (Tylenchorhynchidae)

Other organisms in this Assessment, not chosen for further scrutiny, may be potentially detrimental to the agricultural production systems of the United States. However, there were a variety of reasons for not subjecting them to further analysis: they are associated mainly with plant parts other than commodity; they may be associated with the commodity (however, it was not considered reasonable to expect these pests to remain with the commodity during processing); they have been intercepted, as biological contaminants, by PPQ Officers during inspections of these commodities and would not be expected to be found with every shipment.

7. Economic Importance: Consequences of Introduction

Pests rated for potential economic importance are evaluated against five biological factors. The cumulative score for these elements is the Risk Rating (USDA, 1995).

Pest	Climate/ Host	Host Range	Dispersal	Economic	Environ- mental	Risk Rating
<i>Adoretus sinicus</i>	H	H	H	M	M	H
<i>Agrotis segetum</i>	H	H	H	M	M	H
<i>Amphimallon solstitialis</i>	H	H	H	M	M	H
<i>Anomala corpulenta</i>	H	H	H	M	M	H
<i>Anomala cupripes</i>	H	H	H	M	M	H
<i>Archips oporana</i>	H	H	H	M	M	H

<i>Ceroplastes japonicus</i>	H	H	H	M	M	H
<i>Ceroplastes pseudoceriferus</i>	H	H	H	M	M	H
<i>Ceroplastes rubens</i>	H	H	H	M	M	H
<i>Clania minuscula</i>	H	H	H	M	M	H
<i>Cryptothelea variegata</i>	H	H	H	M	M	H
<i>Cryptympana pustulata</i>	H	H	H	M	M	H
<i>Diroyctia splendidella</i>	H	H	H	M	M	H
<i>Drosicha corpulenta</i>	H	H	H	M	M	H
<i>Gryllotalpa africans</i>	H	H	H	M	M	H
<i>Gypsonoma minutana</i>	H	H	H	M	M	H
<i>Helicoverpa armigera</i>	H	H	H	M	M	H
<i>Helicoverpa assulta</i>	H	H	H	M	M	H
<i>Homona coffearia</i>	H	H	H	M	M	H
<i>Homona magnanima</i>	H	H	H	M	M	H
<i>Icerya seychellarum</i>	H	H	H	M	M	H
<i>Lepidosaphes pini</i>	H	H	H	M	M	H
<i>Mamestra brassicae</i>	H	H	H	M	M	H

<i>Paralepidosaphes tubulorum</i>	H	H	H	M	M	H
<i>Phyllophaga titanis</i>	H	H	H	M	M	H
<i>Sympiezomias velatus</i>	H	H	H	M	M	H
<i>Thrips palmi</i>	H	H	H	M	M	H
<i>Tridactylus japonicus</i>	H	H	H	M	M	H
<i>Bradybaena ravida</i>	H	H	H	M	M	H
<i>Calyptozele sp.</i>	H	H	H	M	M	H
<i>Incilaria sp.</i>	H	H	H	M	M	H
<i>Pestalosphaeria jinggangensis</i>	H	L	H	M	M	M
<i>Pestalotia diospyri</i>	H	M	H	M	M	H
<i>Phellinus noxius</i>	H	H	H	M	M	H
<i>Sphaerella podocarpi</i>	H	L	H	M	M	M
<i>Paratrophorus sp.</i>	H	M	H	M	M	H
<i>Tylenchorhynchus crassicaudatus</i>	H	M	H	M	M	H
<i>Tylenchorhynchus leviterminalis</i>	H	M	H	M	M	H

8. Likelihood of Introduction

The likelihood of introduction for a pest is rated relative to six factors (Tables 6 and 7) (USDA, 1995).

Number of 40' Containers Annually	Rating
10 - 100	M

Pest	Likelihood of surviving postharvest treatment	Likelihood of surviving shipment	Likelihood of not being detected at port of entry	Likelihood of moving to suitable habitat	Likelihood of finding suitable hosts	Risk Rating
<i>Adoretus sinicus</i>	H	H	H	H	H	H
<i>Agrotis segetum</i>	H	H	H	H	H	H
<i>Amphimallon solstitialis</i>	H	H	H	H	H	H
<i>Anomala corpulenta</i>	H	H	H	H	H	H
<i>Anomala cupripes</i>	H	H	H	H	H	H
<i>Archips oporana</i>	H	H	M	H	H	H
<i>Ceroplastes japonicus</i>	H	H	M	H	H	H
<i>Ceroplastes pseudoceriferus</i>	H	H	M	H	H	H
<i>Pseudoplastes rubens</i>	H	H	M	H	H	H
<i>Clania minuscula</i>	H	H	M	H	H	H
<i>Cryptothelea variegata</i>	H	H	M	H	H	H
<i>Cryptotympana pustulata</i>	H	H	H	H	H	H
<i>Drosicha corpulenta</i>	H	H	H	H	H	H
<i>Gryllotalpa africans</i>	H	H	H	H	H	H
<i>Gypsonoma minutana</i>	H	H	M	H	H	H

<i>Helicoverpa armigera</i>	H	M	M	M	H	H
<i>Helicoverpa assulta</i>	H	M	M	M	H	H
<i>Homona coffearia</i>	H	H	M	H	H	H
<i>Homona magnanima</i>	H	H	M	H	H	H
<i>Icerya seychellarum</i>	H	H	M	H	H	
<i>Lepidosaphes pini</i>	H	H	H	H	H	H
<i>Mamestra brassicae</i>	H	H	M	H	H	H
<i>Paralepidosaphes tubulorum</i>	H	H	H	H	H	H
<i>Phyllophaga titanis</i>	H	H	H	H	H	H
<i>Sympiezomias velatus</i>	H	H	H	H	H	H
<i>Thrips palmi</i>	H	H	M	H	H	H
<i>Tridactylus japonicus</i>	H	H	H	H	H	H
<i>Bradybaena ravida</i>	H	H	H	H	H	H
<i>Calyptozele</i> sp.	H	H	H	H	H	H
<i>Incilaria</i> sp.	H	H	H	H	H	H
<i>Pestalospaeria jinggangensis</i>	H	H	M	H	H	H
<i>Pestalotia diospyri</i>	H	H	M	H	H	H
<i>Phellinus noxius</i>	H	H	M	H	H	H
<i>Sphaerella podocarpi</i>	H	H	M	H	H	H
<i>Paratrophorus</i> sp.	H	H	H	H	H	H
<i>Tylenchorhynchus crassicaudatus</i>	H	H	H	H	H	H
<i>Tylenchorhynchus leviterminalis</i>	H	H	H	H	H	H

9. Pest Risk Potential

Pest Risk Potential is the combination of the consequences and likelihood of introductions (Tables 5 - 7) (USDA, 1995).

Table 8: Pest Risk Potential	
Pest	Pest Risk Potential
<i>Adoretus sinicus</i>	H
<i>Agrotis segetum</i>	H
<i>Amphimallon solstitialis</i>	H
<i>Anomala cupripes</i>	H
<i>Anomala corpulenta</i>	H
<i>Archips orana</i>	H
<i>Bradybaena ravidia</i>	H
<i>Ceroplastes japonicus</i>	H
<i>Ceroplastes pseudoceriferus</i>	H
<i>Ceroplastes rubens</i>	H
<i>Clania minuscula</i>	H
<i>Cryptothelea variegata</i>	H
<i>Cryptotympana pustulata</i>	H
<i>Dioryctia splendidella</i>	H
<i>Drosicha corpulenta</i>	H
<i>Grylotalpa africans</i>	H
<i>Gypsonoma minutana</i>	H
<i>Helicoverpa armigera</i>	H
<i>Helicoverpa assulta</i>	H
<i>Homona coffearia</i>	H
<i>Homona magnanima</i>	H
<i>Icerya seychellarum</i>	H
<i>Lepidosaphes pini</i>	H
<i>Mamestra brassicae</i>	H
<i>Paralepidosaphes tubulorum</i>	H
<i>Phyllophaga titanis</i>	H
<i>Spodoptera litura</i>	H
<i>Sympiezomias velatus</i>	H

<i>Thrips palmi</i>	H
<i>Tridactylus japonicus</i>	H
<i>Calyptozele</i> sp.	H
<i>Incilaria</i> sp.	H
<i>Pestalospaeria jinggangensis</i>	H
<i>Pestalotia diospyri</i>	H
<i>Phellinus noxius</i>	H
<i>Sphaerella podocarpi</i>	H
<i>Paratrophorus</i> sp.	H
<i>Tylenchorhynchus crassicaudatus</i>	H
<i>Tylenchorhynchus leviterminalis</i>	H

Phytosanitary Measures

Numerous potential biological hazards are associated with the importation of propagative material in growing media. In the case of Chinese penjing, the plants are grown in the open, in proximity to the ground and in or around agricultural production areas. Other factors which exacerbate the pest risk are inadequate pest control, plants collected from the wild, the continual flow of plant material into and out of facilities and soil movement from adjacent agricultural areas. These conditions act in concert to produce a great potential for contaminants, pest organisms of plants from nature and windborne infestations to establish in the nursery stock.

From the perspective of this risk assessment, most of the organisms of concern (some arthropods, snails, nematodes and weed seeds) are soil inhabitants during at least one portion of their life histories. Other potential hazards include fungal fruiting bodies with a latent period. These organisms have a high Pest Risk Potential and will require specific measures to insure phytosanitary security. Accordingly, mitigation measures based solely on Port of Entry inspections may be inadequate in providing this security. However, the choice of appropriate sanitary and phytosanitary measures to mitigate risks associated with these pest species is undertaken as part of Risk Management, and is not addressed, *per se*, in this document. Should additional pests, not identified in this Risk Assessment, be intercepted, appropriate quarantine action will be taken.

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not included (saprophytes)

Scolecobasidium tricladiatum T. Matsushima

(Fungi Imperfecti, Hyphomycetes) CN

Cinnamomum

Eucalyptus

Pinus

Podocarpus z_e Matsushima, 1980; Farr, 1994

Sympodiella laxa

Subramanian & Vittal

(Fungi Imperfecti, Hyphomycetes] CN Calophyllum

Cunninghamia

Daphniphyllum

Garcinia

Podocarpus z_e Matsushima, 1980

Importation of Chinese Penjing
into the United States
With Particular Reference to *Sageretia thea*

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A. Introduction

This pest risk assessment (PRA) was conducted by the United States Department of Agriculture, Animal and Plant Health Inspection Service, Plant Protection and Quarantine, Biological Assessment and Taxonomic Support Staff (USDA, APHIS, PPQ, BATS) on *Sageretia thea* penjing, established in a growing medium, from China. The results are expressed qualitatively (“high” or “low”), rather than quantitatively (probabilities or frequencies). The risk assessment methodology and rating criteria can be found in the document: *Pathway-Initiated Pest Risk Assessment: Guidelines for Qualitative Assessments* (USDA, 1995) (available from the authors of this risk assessment). Authority for APHIS to regulate plant pests/plant products is derived from the Plant Quarantine Act of 1912, the Plant Pest Act of 1957, the Noxious Weed Act of 1974 and the Code of Federal Regulations, Title 7, Part 319, Subpart 37 (7 CFR 319.37 - Nursery Stock, Plants, Roots, Bulbs, Seeds and Other Plant Products). The methods and terminology used to initiate, conduct, and report this PRA are consistent with guidelines provided by FAO (1995) and NAPPO (1995).

B. Risk Assessment

1. Initiating Event: Proposed Action

China has been exporting significant volumes of bare root bonsai plants into the United States for a number of years. In August, 1992 representatives of the China Animal and Plant Quarantine Service (CAPQ), requested permission to export penjing (landscape bonsai) established in growing media. A list of 112 plant species was submitted. From these plants; categorized by PPQ, as prohibited, postentry, and restricted; CAPQ was asked in January, 1994, to select five restricted species. Subsequently, CAPQ submitted a list of eight species, along with a list of pests or potential pests of each species. In April 1994, the BATS Staff identified five species as candidates for pest risk assessments: *Buxus sinica* (Buxaceae), *Ehretia (Carmona) microphylla* (Boraginaceae), *Podocarpus macrophyllus* (Podocarpaceae), *Sageretia thea (theazans)* (Rhamnaceae), and *Serissa foetida* (Rubiaceae).

There are special concerns associated with propagative material in growing media: the presence of biological contaminants may not be discernible by visual inspection (this includes both pre-shipment and Port of Entry inspections); the infeasibility of complete inspection greatly increases the potential of the introduction of exotic organisms; the treatment(s) of the growing media may not be entirely efficacious; the continual hazard of pest infestation/reinfestation of “clean” plants.

2. Assessment of Weediness Potential of *Sageretia* spp.

The results of the weediness screening for *Sageretia* (Table 1) did not prompt a pest-initiated risk assessment.

Table 1: Process for Determining Weediness Potential of Commodity

Commodity: *Sageretia* spp. (Rhamnaceae)

Phase 1: The genus *Sageretia* consists of about 35 species of deciduous or evergreen, usually spiny shrubs, native to east and south Asia and to North America. *Sageretia* is sometimes planted as an ornamental in California.

Phase 2: Is the genus listed in:

NO *Geographical Atlas of World Weeds* (Holm *et al.*, 1979)

NO *World's Worst Weeds* (Holm *et al.*, 1977)

NO *Report of the Technical Committee to Evaluate Noxious Weeds; Exotic Weeds for Federal Noxious Weed Act* (Gunn and Ritchie, 1982)

NO *Economically Important Foreign Weeds* (Reed, 1977)

NO Weed Science Society of America list (WSSA, 1989)

NO Is there any literature reference indicating weediness (*e.g.*, AGRICOLA, CAB, Biological Abstracts, AGRIS; search on "species name" combined with "weed").

Phase 3: Conclusion:

- IF:**
1. The species is widely prevalent in the United States and the answer to all of the questions is **no...**
Proceed with the pest risk assessment.
 2. The species is widely prevalent in the United States and the answer to **one** or more of the questions is **yes...**
Proceed with the pest risk assessment, provide comments on findings in text, and incorporate findings regarding weediness into the Risk Elements described below.
 3. The species is new to or not widely prevalent in the United States and the answer to all of the questions is **no...**
Proceed with the pest risk assessment.
 4. The species is new to or not widely prevalent in the United States and the answer to **one or more** of the questions is **yes...**
Consult authority under the Federal Noxious Weed Act for listing plant species as a noxious weed and consider the advisability of performing a pest-initiated pest risk assessment on the plant species. Provide explanations of findings in text.

3. Previous Risk Assessments, Current Status and Pest Interceptions Decision History for *Sageretia* spp. from China

None

Pest Interceptions on *Sageretia* from China - FY85-95

Ascochyta sp.

4. Pests associated with *Sageretia* spp. in China

Table 2. Pests of <i>Sageretia</i>				
Scientific Name	Dist. ¹	Host Genera ²	Codes ³	References
ARTHROPODA AND MOLLUSCA				
<i>Acalitus sageretiae</i> Kuang (Acarina: Eriophyidae)	CN	Sageretia	z _e	China, 1994, 1995
<i>Acanthopsyche</i> sp. (Lepidoptera: Psychidae)	CN	Sageretia	n, z	China, 1994, 1995
<i>Iterates Senecas</i> Burmeister (Coleoptera: Scarabaeidae)	CN, HI	Poly. Camellia, Morus, Diospyros, Firmiana, Theobroma, Asparagus, Abelmoschus, Vitis, Gossypium, Phaseolus, Populus	h, n, z(soil)	CFR 318.13; China, 1995, INKTO, No. 89
<i>Agrotis segetum</i> (D. and S.) (Lepidoptera: Noctuidae)	CN	Poly. Citrus, Malus, Olea, Vitis, Zea	n	Carter, 1984; China, 1995; INKTO No. 25
<i>Amphimallon solstitialis</i> (L.) (Coleoptera: Scarabaeidae)	CN	Poly. Pinus, Beta, Solanum	n, z(soil)	Browne, 1968; China, 1995 CIE, 1979; INKTO, No. 99
<i>Anomala corpulenta</i> Motschulsky (Coleoptera: Scarabaeidae)	CN	Poly. Buxus, Juglans, Cunninghamia, Juniperus, Malus, Pinus, Prunus, Sabina, Salix, Ulmus, Vericia	z (soil)	China, 1994, 1995
<i>Anomala cupripes</i> Hope (Coleoptera: Scarabaeidae)	CN	Poly. Buxus, Camellia, Delonix, Ficus, Hevea, Dimocarpus, Litchi, Mangifera	z (soil)	China, 1994, 1995 Gordon, 1994
<i>Aonidiella inornata</i> McKenzie (Homoptera: Diaspididae)	CN, TX, HI	Poly. Sageretia, Citrus, Mangifera, Cocos	n, z	China, 1994; Nakahara, 1982
<i>Aphis gossypii</i> Glover (Homoptera: Aphididae)	CN, US	Poly. Sageretia, Serissa	c, z	China, 1994; CIE, 1968; Patch, 1938; Wilson and Vickery, 1918; Smith and Parron, 1978
<i>Aporia crataegi</i> L. (Lepidoptera: Pieridae)	CN	Poly. Crataegus, Malus, Prunus, Pyrus, Salix, Ulmus	n	China, 1995; Anonymous, 1972; INKTO, No. 149
<i>Bradybaena ravida</i> (Benson) (Mollusca: Bradybaenidae)	CN	Poly. Ehretia, Gardenia, Chrysanthemum, Rosa, Prunus, Cymbidium, Iris	n, z(soil) z	China, 1995; Likhachev and Rammelmeier, 1962; PPQ interception

<i>Bradybaena similaris</i> (Ferussac) (Mollusca: Bradybaenidae)	CN, US	Poly. Sageretia	c, z, z(soil)	Chang and Chen, 1989; China, 1994; Dundee, 1970
Cecidomyiidae sp. (Diptera: Cecidomyiidae)	CN	Sageretia	n, z	PPQ interception
<i>Chrysodeixis chalcites</i> (Esper) (Lepidoptera: Noctuidae)	CN	Poly. Ficus, Brassica, Coffea, Cucumis, Cynara, Cucurbita, Echium, Glycine, Gossypium, Lycopersicon, Utica, Marrubium, Medicago, Nicotiana, Phaseolus, Salvia, Solanum, Trifolium, Zea	n	China, 1995; CIE, 1977; Goodey, 1991; Taylor, 1980
Coccidae sp. (Homoptera: Coccidae)	CN	Sageretia	n, z	China, 1994, 1995
<i>Conogethes punctiferalis</i> (Guenée) (Lepidoptera: Pyralidae)	CN	Poly. Gossypium, Pinus, Helianthus, Prunus, Pyrus, Sorghum, Zea, Castanea	n	China, 1995; INKTO
<i>Dasineura</i> sp. (Diptera: Cecidomyiidae)	CN	Sageretia	n, z	PPQ interception
Diaspididae sp. (Homoptera: Diaspididae)	CN	Sageretia	n, z	China, 1994, 1995
<i>Drosicha corpulenta</i> (Kuwana) (Homoptera: Margarodidae)	CN	Poly. Buxus, Magnolia, Paulownia, Plantanus, Salix, Melia, Sophora, Podocarpus, Ziziphus, Diospyros, Malus, Pyrus, Citrus, Prunus, Castanea, Quercus, Ficus	z (soil), z	China, 1994, 1995; Shiraki, 1952
<i>Gryllotalpa africans</i> Palisot de Beauvois (Orthoptera: Gryllotalpidae)	CN	Poly. Solanum, Pinus, Saccharum, Gossypium, Vitis, Fragaria, Camellia, Dianthus, Prunus, Fortunella, Nicotiana	n, z (soil)	China, 1995; INKTO, No. 197
<i>Helicoverpa armigera</i> (Hübner) (Lepidoptera: Noctuidae)	CN	Poly. Glycine, Nicotiana, Gossypium, Triticum, Lycopersicon, Medicago, Solanum, Tagetes, Zea	n, z(soil)	Avidov and Harpaz, 1969; China, 1995; CIE. 1993a
<i>Helicoverpa assulta</i> (Guenée) (Lepidoptera: Noctuidae)	CN	Poly. Capsicum, Cucumis, Gossypium, Ipomoea, Nicotiana, Sorghum, Zea	n, z(soil)	China, 1995; CIE, 1994

<i>Icerya aegyptica</i> (Douglas) (Homoptera: Margarodidae)	CN	Poly. Citrus, Ficus, Cinnamomum, Morus Diospyros, Psidium, >100 hosts	n	China, 1995; CIE, 1966; INKTO, No. 119; Willians, 1985
<i>Kleidocerys</i> sp. (Heteroptera: Lygaeidae)	CN	Sageretia	n, z,	PPQ interception
<i>Mamestra brassicae</i> (L.) (Lepidoptera: Noctuidae)	CN	Poly. Beta, Brassica, Daucus, Gossypium, Morus, Nicotiana, Pisum, Saccharum, Solanum, Triticum, Vicia	n	China, 1995; INKTO, No. 61
<i>Phyllophaga</i> sp. (Coleoptera: Scarabaeidae)	CN	Poly. Serissa	n, z(soil), z,	China, 1995; PPQ interception
<i>Phyllophaga titanis</i> Reitter (Coleoptera: Scarabaeidae)	CN	Poly. Buxus, Rosa, Sophora, Ulmus	z (soil)	China, 1995; Gordon, 1994
<i>Pseudaonidia trilobitiformis</i> (Green) (Homoptera: Diaspididae)	CN, FL	Poly. Sageretia, Citrus, Theobroma, Coffea, Annona, Mangifera, Ixora, Persea, Cocos	n, z,	China, 1994; CIE, 1981; Nakahara, 1982
<i>Pseudaulcaspis pentagona</i> (Targioni) (Homoptera: Diaspididae)	CN, US	Poly. Sageretia, Ilex, Diospyros, Callicarpa, Prunus, Vaccinium, Carya, Ficus, Camellia, Syringa, Morus	c, z,	Argyriou and Kourmadas, 1981; China, 1994; Dekle, 1965; Jiang, 1985; Nakahara, 1982; Tippins and Howell, 1983
Pseudococcidae sp. (Homoptera: Pseudococcidae)	CN	Sageretia	n, z, z(soil)	China, 1994, 1995
<i>Rhizoecus hibisci</i> Kawai and Takagi (Homoptera: Pseudococcidae)	CN, HI	Serissa, Cryptanthus, Rhaphis, Zelkova, Carex, Crinum, Cuphea, Sabal, Dieffenbachia, Hibiscus, Hakonechloa, Nerium, Pelargonium, Phoenix	z (soil)	EPPO
<i>Spodoptera litura</i> (F.) (Lepidoptera: Noctuidae)	CN	Poly. Arachis, Beta, Brassica, Citrus, Glycine, Gossypium, Ipomoea, Morus, Nicotiana, Oryza, Solanum, Sorghum, Ulmus, Zea	n	China, 1995; CIE, 1993b; INKTO, No. 12
<i>Sympiezomias velatus</i> Chevrolet (Coleoptera: Curculionidae)	CN	Sophora, Populus, Morus, Glycine, Beta, Castanea, 70 genera, 101 species recorded.	z(soil), z	China, 1995

<i>Thrips palmi</i> Karny (Thysanoptera: Thripidae)	CN, FL, HI	Polyphagous	g, n	CIE, 1992; Smith <i>et al.</i> , 1992
<i>Tridactylus japonicus</i> de Hoan (Orthoptera: Trydactilidae)	CN	Buxus, Camellia, Cedrus, Fragaria, Gossypium, Oryza Nicotiana, Rosa, Sabina, Saccharinum	z (soil), z	China, 1994, 1995; Shiraki, 1952
"Calyptozele sp." (?) Unknown	CN	Podocarpus, Sageretia, Serissa	unknown	China 1994, 1995
FUNGI				
<i>Aecidium sageretiae</i> P. Henn. (Basidiomycetes, Uredinales)	CN	Sageretia	z _{ei}	China, 1992; Farr <i>et al.</i> 1989; Farr, 1994; Tai, 1979
Ascomycete sp.	CN	Sageretia	z _{ei}	China, 1992, 1995
<i>Erysiphe</i> sp. (Pyrenomycetes, Erysiphales)	CN	Sageretia	z _{ei}	China, 1992
<i>Dennisiella babingtonii</i> (Berk.) Batista & Cif. Anamorph: <i>Microxiphium fagi</i> (Pers.) S. J. Hughes Syn.: <i>Capnodium footii</i> Harvey ex Berk. & Desmaz., nom. illeg. (Loculoascomycetes, Dothideales)	CN, US	Buxus, Ehretia, Ilicium, Sageretia	o, z _{ei}	China 1992; Farr <i>et al.</i> , 1989
<i>Leptosphaeria</i> sp. (Loculoascomycetes, Dothideales)	CN	Sageretia	z _{ei}	China, 1992; China, 1995
<i>Microsphaeropsis</i> sp. (Fungi Imperfecti, Coelomycetes)	CN	Sageretia	z _{ei}	China, 1992; Farr, <i>et al.</i> , 1989
<i>Phoma</i> sp. (Fungi Imperfecti, Coelomycetes)	CN	Sageretia, Serissa	z _{ei}	China, 1992; China, 1995
NEMATODA				
<i>Aphelenchoides besseyi</i> Christie (Aphelenchoididae)	CN, US	Various genera	o, z(soil)	Anonymous, 1984; EPPO, 1996a
<i>Aphelenchus</i> sp. (Aphelenchidae)	CN	Unknown	z(soil)	EPPO, 1996a
<i>Criconemella</i> sp. (Criconematidae)	CN	Unknown	z(soil)	EPPO, 1996a

Dorylaimidae sp. (Dorylaimidae)	CN	Unknown	z(soil)	EPPO, 1996a
<i>Dorylaimus</i> sp. (Dorylaimidae)	CN	Unknown	z(soil)	EPPO, 1996b
<i>Helicotylenchus</i> sp. (Hoplolaimidae)	CN	Unknown	z(soil)	EPPO, 1996a; b
<i>Helicotylenchus dihystra</i> (Cobb) Sher (Hoplolaimidae)	CN, US	Various genera	o, z(soil)	Anonymous, 1984; EPPO, 1996a; b
<i>Hirschmanniella</i> sp. (Pratylenchidae)	CN	Unknown	z(soil)	EPPO, 1996a;b
<i>Meloidogyne</i> sp. (Heteroderidae)	CN	Unknown	z(soil)	EPPO, 1996b
<i>Paratrophorus</i> sp. (Belonolaimiidae)	CN	Unknown	z(soil)	EPPO, 1996a
<i>Pratylenchus brachyurus</i> (Godfrey) Filipjev & Schuurmans Stekhoven (Pratylenchidae)	CN, US	Various genera	o, z(soil)	Anonymous, 1984; EPPO, 1996b
<i>Pratylenchus penetrans</i> (Cobb) Filipjev & Stekhoven (Pratylenchidae)	CN, US	Sageretia	o,z(soil)	Anonymous, 1984; China, 1992
<i>Pratylenchus</i> sp. (Pratylenchidae)	CN	Unknown	z(soil)	EPPO, 1996a; b
<i>Rotylenchus robustus</i> (deMan) Filipjev (Hoplolaimidae)	CN, US	Various genera	o, z(soil)	EPPO, 1996b
<i>Trichodorus</i> sp. (Trichodoridae)	CN	Unknown	z(soil)	EPPO, 1996a
<i>Tylenchorhynchus</i> sp. (Tylenchorhynchidae)	CN	Unknown	z(soil)	EPPO, 1996a
<i>Tylenchorhynchus</i> <i>crassicaudatus</i> Williams (Tylenchorhynchidae)	CN	Oryza	z(soil)	EPPO, 1996a; b
<i>Tylenchorhynchus</i> <i>leviterminalis</i> Siddiqi, Mukherjee & Dasgupta (Tylenchorhynchidae)	CN	Unknown	z(soil)	EPPO, 1996a; b

<i>Tylenchus</i> sp. (Tylenchidae)	CN	Unknown	z(soil)	EPPO, 1996a
<i>Xiphinema brasiliense</i> Lordello (Longidoridae)	CN, US (FL)	Unknown	o, z(soil)	EPPO, 1996b
<i>Xiphinema</i> sp. (Longidoridae)	CN	Unknown	z(soil)	EPPO, 1996a;b

¹Geographical distribution is denoted as follows: CN-People's Republic of China, FL-Florida, HI-Hawaii, TX-Texas, US- United States

²Host genera identified in literature and by CAPQ

³Codes: c - Listed in USDA catalogue of intercepted pests as non-actionable.

e - Although pest attacks commodity, it would not be expected to remain with the commodity (plant part) during processing

g - Quarantine pest; pest has limited distribution in the U.S. and is under official control as follows: pest listed by name in USDA's pest dictionary, official quarantine action may be taken on this pest when intercepted on this commodity.

h - Quarantine pest; pest has limited distribution in the U.S. and is under official control as follows: (1) pest listed by name in USDA's pest dictionary, official quarantine action may be taken on this pest when intercepted on this commodity and, (2) pest is a program pest (there is an official Federal or recognized State program for control of this pest beyond its being listed in the pest dictionary as actionable.)

n - Listed in the USDA catalogue of intercepted pests as actionable.

o - Organism does not meet the geographical and regulatory definition for a quarantine pest.

z - External feeder: Pest is known to commonly attack or infect commodity and it would be reasonable to expect the pest may remain with the commodity during processing and shipping.

⁴Scientific names and authors are from Bradbury (1986) and Farr *et al.* (1989).

5. List of Quarantine Pests

Table 3: Quarantine Pests - *Sageretia***ARTHROPODA**

- Acalitus sageretiae* Kuang (Acarina: Eriophyidae)
Adoretus sinicus Burmeister (Coleoptera: Scarabaeidae)
Agrotis segetum (D. and S.) (Lepidoptera: Noctuidae)
Amphimallon solstitialis (L.) (Coleoptera: Scarabaeidae)
Anomala corpulenta Motschulsky (Coleoptera: Scarabaeidae)
Anomala cupripes Hope (Coleoptera: Scarabaeidae)
Aonidiella inornata McKenzie (Homoptera: Diaspididae)
Aporia crataegi L. (Lepidoptera: Pieridae)
Chrysodeixis chalcites (Esper) (Lepidoptera: Noctuidae)
Conogethes punctiferalis (Guenée) (Lepidoptera: Pyralidae)
Drosicha corpulenta (Kuwana) (Homoptera: Margarodidae)
Gryllotalpa africans Palisot de Beauvois (Orthoptera: Gryllotalpidae)
Helicoverpa armigera (Hübner) (Lepidoptera: Noctuidae)
Helicoverpa assulta (Guenée) (Lepidoptera: Noctuidae)
Icerya aegyptica (Douglas) (Homoptera: Margarodidae)
Mamestra brassicae (L.) (Lepidoptera: Noctuidae)
Phyllophaga titanis Reitter (Coleoptera: Scarabaeidae)
Pseudaonidia trilobitiformis (Green) (Homoptera: Diaspididae)
Rhizoecus hibisci Kawai and Takagi (Homoptera: Pseudococcidae)
Spodoptera litura (F.) (Lepidoptera: Noctuidae)
Sympiezomias velatus Chevrollet (Coleoptera: Curculionidae)
Thrips palmi Karny (Thysanoptera: Thripidae)
Tridactylus japonicus de Hoan (Orthoptera: Trydactilidae)

MOLLUSCA

- Bradybaena ravida* (Benson) (Mollusca: Bradybaenidae)

UNKNOWN

- “*Calyptozele* sp.”

FUNGI

- Aecidium sageretiae* P. Henn. (Basidiomycetes, Uredinales)

NEMATODA

- Paratrophorus* sp. (Belonolaimiidae)
Tylenchorhynchus crassicaudatus Williams (Tylenchorhynchidae)
Tylenchorhynchus leviterminalis Siddiqi, Mukherjee & Dasgupta (Tylenchorhynchidae)

6. Quarantine Pests Likely to Follow Pathway

Table 4: Quarantine Pests Likely to Follow Pathway - *Sageretia***ARTHROPODA**

Acalitus sageretiae Kuang (Acarina: Eriophyidae)
Adoretus sinicus Burmeister (Coleoptera: Scarabaeidae)
Amphimallon solstitialis (L.) (Coleoptera: Scarabaeidae)
Anomala corpulenta Motschulsky (Coleoptera: Scarabaeidae)
Anomala cupripes Hope (Coleoptera: Scarabaeidae)
Aonidiella inornata McKenzie (Homoptera: Diaspididae)
Drosicha corpulenta (Kuwana) (Homoptera: Margarodidae)
Gryllotalpa africans Palisot de Beauvois (Orthoptera: Gryllotalpidae)
Helicoverpa armigera (Hübner) (Lepidoptera: Noctuidae)
Helicoverpa assulta (Guenée) (Lepidoptera: Noctuidae)
Phyllophaga titanis Reitter (Coleoptera: Scarabaeidae)
Pseudaonidia trilobitiformis (Green) (Homoptera: Diaspididae)
Rhizoecus hibisci Kawai and Takagi (Homoptera: Pseudococcidae)
Sympiezomias velatus Chevrollet (Coleoptera: Curculionidae)
Thrips palmi Karny (Thysanoptera: Thripidae)
Tridactylus japonicus de Hoan (Orthoptera: Trydactilidae)

MOLLUSCA

Bradybaena ravida (Benson) (Mollusca: Bradybaenidae)

UNKNOWN

“Calyptozele sp.”

FUNGI

Aecidium sageretiae P. Henn. (Basidiomycetes, Uredinales)

NEMATODA

Paratrophorus sp. (Belonolaimiidae)
Tylenchorhynchus crassicaudatus Williams (Tylenchorhynchidae)
Tylenchorhynchus leviterminalis Siddiqi, Mukherjee & Dasgupta (Tylenchorhynchidae)

Other organisms in this Assessment, not chosen for further scrutiny, may be potentially detrimental to the agricultural production systems of the United States. However, there were a variety of reasons for not subjecting them to further analysis: they are associated mainly with plant parts other than commodity; they may be associated with the commodity (however, it was not considered reasonable to expect these pests to remain with the commodity during processing); they have been intercepted, as biological contaminants, by PPQ Officers during inspections of these commodities and would not be expected to be found with every shipment.

7. Economic Importance: Consequences of Introduction

Pests rated for potential economic importance are evaluated against five biological factors. The cumulative score for these elements is the Risk Rating (USDA, 1995).

Pest	Climate/ Host	Host Range	Dispersal	Economic	Environ- mental	Risk Rating
<i>Acalitus sageretiae</i>	H	H	H	M	M	H
<i>Adoretus sinicus</i>	H	H	H	M	M	H
<i>Agrotis segetum</i>	H	H	H	M	M	H
<i>Amphimallon solstitialis</i>	H	H	H	M	M	H
<i>Anomala corpulenta</i>	H	H	H	M	M	H
<i>Anomala cupripes</i>	H	H	H	M	M	H
<i>Aonidiella inornata</i>	H	H	H	M	M	H
<i>Bradybaena ravidia</i>	H	H	H	H	H	H
<i>Drosicha corpulentata</i>	H	H	H	M	M	H
<i>Gryllotalpa africans</i>	H	H	H	M	M	H
<i>Helicoverpa armigera</i>	H	H	H	M	M	H
<i>Helicoverpa assulta</i>	H	H	H	M	M	H
<i>Phyllophaga titanis</i>	H	H	H	M	M	H
<i>Pseudoaonidia trilobitiformis</i>	H	H	H	M	M	H
<i>Rhizoecus hibisci</i>	H	H	H	M	M	H
<i>Sympiezomias velatus</i>	H	H	H	M	M	H
<i>Thrips palmi</i>	H	H	H	M	M	H

<i>Tridactylus japonicus</i>	H	H	H	M	M	H
<i>Bradybaena ravida</i>	H	H	H	M	M	H
<i>Calyptozele</i> sp.	H	H	H	M	M	H
<i>Aecidium sageretiae</i>	H	L	H	M	M	M
<i>Paratrophorus</i> sp.	H	M	H	M	M	H
<i>Tylenchorhynchus crassicaudatus</i>	H	M	H	M	M	H
<i>Tylenchorhynchus leviterminalis</i>	H	M	H	M	M	H

8. Likelihood of Introduction

The likelihood of introduction for a pest is rated relative to six factors (Tables 6 and 7) (USDA, 1995).

Table 6: Amount of Commodity Shipped	
Number of 40' Containers Annually	Rating
10 - 100	M

Table 7: Risk Rating - Likelihood of Introduction						
Pest	Likelihood of surviving postharvest treatment	Likelihood of surviving shipment	Likelihood of not being detected at port of entry	Likelihood of moving to suitable habitat	Likelihood of finding suitable hosts	Risk Rating
<i>Acalitus sageretiae</i>	H	H	H	H	H	H
<i>Adoretus sinicus</i>	H	H	H	H	H	H
<i>Amphimallon solstitialis</i>	H	H	H	H	H	H
<i>Anomala corpulenta</i>	H	H	H	H	H	H
<i>Anomala cupripes</i>	H	H	H	H	H	H

<i>Aonidiella inornata</i>	H	H	M	H	H	H
<i>Bradybaena ravidia</i>	H	H	H	H	H	H
<i>Drosicha corpulenta</i>	H	H	H	H	H	H
<i>Grylotalpa africans</i>	H	H	H	H	H	H
<i>Helicoverpa armigera</i>	H	M	M	M	H	H
<i>Helicoverpa assulta</i>	H	M	M	M	H	H
<i>Phyllophaga titanis</i>	H	H	H	H	H	H
<i>Pseudaonidia trilobitiformis</i>	H	H	M	H	H	H
<i>Rhizoecus hibisci</i>	H	H	H	H	H	H
<i>Sympiezomias velatus</i>	H	H	H	H	H	H
<i>Thrips palmi</i>	H	H	M	H	H	H
<i>Tridactylus japonicus</i>	H	H	H	H	H	H
<i>Calyptozele sp.</i>	H	H	H	H	H	H
<i>Aecidium sageretiae</i>	H	H	M	H	H	H
<i>Paratrophorus sp.</i>	H	H	H	H	H	H
<i>Tylenchorynchus crassicaudatus</i>	H	H	H	H	H	H
<i>Tylenchorynchus leviterminalis</i>	H	H	H	H	H	H

9. Pest Risk Potential

Pest Risk Potential is the combination of the consequences and likelihood of introductions (Tables 5, 6

and 7) (USDA, 1995).

Table 8: Pest Risk Potential	
Pest	Pest Risk Potential
<i>Acalitus sageretiae</i>	H
<i>Adoretus sinicus</i>	H
<i>Amphimallon solstitialis</i>	H
<i>Anomala corpulenta</i>	H
<i>Anomala cupripes</i>	H
<i>Aonidiella inornata</i>	H
<i>Bradybaena ravida</i>	H
<i>Calyptozele</i> sp.	H
<i>Drosicha corpulenta</i>	H
<i>Gryllotalpa africans</i>	H
<i>Helicoverpa armigera</i>	H
<i>Helicoverpa assulta</i>	H
<i>Phyllophaga titanis</i>	H
<i>Pseudaonidia trilobitiformis</i>	H
<i>Rhizoecus hibisci</i>	H
<i>Sympiezomias velatus</i>	H
<i>Thrips palmi</i>	H
<i>Tridactylus japonicus</i>	H
<i>Aecidium sageretiae</i>	H
<i>Paratrophorus</i> sp.	H
<i>Tylenchorynchus crassicaudatus</i>	H
<i>Tylenchorynchus leviterminalis</i>	H

Phytosanitary Measures

Numerous potential biological hazards are associated with the importation of propagative material in growing media. In the case of Chinese penjing, the plants are grown in the open, in proximity to the

ground and in or around agricultural production areas. Other factors which exacerbate the pest risk are inadequate pest control, plants collected from the wild, the continual flow of plant material into and out of facilities and soil movement from adjacent agricultural areas. These conditions act in concert to produce a great potential for contaminants, pest organisms of plants from nature and windborne infestations to establish in the nursery stock.

From the perspective of this risk assessment, most of the organisms of concern (some arthropods, snails, nematodes and weed seeds) are soil inhabitants during at least one portion of their life histories. Other potential hazards include fungal fruiting bodies with a latent period. These organisms have a high Pest Risk Potential and will require specific measures to insure phytosanitary security. Accordingly, mitigation measures based solely on Port of Entry inspections may be inadequate in providing this security. However, the choice of appropriate sanitary and phytosanitary measures to mitigate risks associated with these pest species is undertaken as part of Risk Management, and is not addressed, *per se*, in this document. Should additional pests, not identified in this Risk Assessment, be intercepted, appropriate quarantine action will be taken.

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A. Introduction

This pest risk assessment (PRA) was conducted by the United States Department of Agriculture, Animal and Plant Health Inspection Service, Plant Protection and Quarantine, Biological Assessment and Taxonomic Support Staff (USDA, APHIS, PPQ, BATS) on *Serissa foetida* penjing, established in a growing medium, from China. The results are expressed qualitatively (“high” or “low”), rather than quantitatively (probabilities or frequencies). The risk assessment methodology and rating criteria can be found in the document: *Pathway-Initiated Pest Risk Assessment: Guidelines for Qualitative Assessments* (USDA, 1995) (available from the authors of this risk assessment). Authority for APHIS to regulate plant pests/plant products is derived from the Plant Quarantine Act of 1912, the Plant Pest Act of 1957, the Noxious Weed Act of 1974 and the Code of Federal Regulations, Title 7, Part 319, Subpart 37 (7 CFR 319.37 - Nursery Stock, Plants, Roots, Bulbs, Seeds and Other Plant Products). The methods and terminology used to initiate, conduct, and report this PRA are consistent with guidelines provided by FAO (1995) and NAPPO (1995).

B. Risk Assessment

1. Initiating Event: Proposed Action

China has been exporting significant volumes of bare root bonsai plants into the United States for a number of years. In August, 1992 representatives of the China Animal and Plant Quarantine Service (CAPQ), requested permission to export penjing (landscape bonsai) established in growing media. A list of 112 plant species was submitted. From these plants, categorized by PPQ, as prohibited, postentry, and restricted; CAPQ was asked in January, 1994, to select five restricted species. Subsequently, CAPQ submitted a list of eight species, along with a list of pests or potential pests of each species. In April 1994, the BATS Staff identified five species as candidates for pest risk assessments: *Buxus sinica* (Buxaceae), *Ehretia (Carmona) microphylla* (Boraginaceae), *Podocarpus macrophyllus* (Podocarpaceae), *Sageretia thea (theazans)* (Rhamnaceae), and *Serissa foetida* (Rubiaceae).

There are special concerns associated with propagative material in growing media: the presence of biological contaminants may not be discernible by visual inspection (this includes both pre-shipment and Port of Entry inspections); the infeasibility of complete inspection greatly increases the potential of the introduction of exotic organisms; the treatment(s) of the growing media may not be entirely efficacious; the continual hazard of pest infestation/reinfestation of “clean” plants.

2. Assessment of Weediness Potential of *Ehretia* spp.

The results of the weediness screening for *Ehretia* (Table 1) did not prompt a pest-initiated risk assessment.

Table 1: Process for Determining Weediness Potential of Commodity	
Commodity:	<i>Serissa</i> spp. (Rubiaceae)
Phase 1:	The genus <i>Serissa</i> consists of one (some botanists split it into three) species of cultivated ornamental shrub(s), native to southeast Asia. <i>S. foetida</i> (<i>S. japonica</i>) may be planted as an ornamental in warm areas of the United States or under glass.
Phase 2:	Is the genus listed in: <ul style="list-style-type: none"> <u>NO</u> <i>Geographical Atlas of World Weeds</i> (Holm et al., 1979) <u>NO</u> <i>World's Worst Weeds</i> (Holm et al., 1977) <u>NO</u> Report of the Technical Committee to Evaluate Noxious Weeds; Exotic Weeds for Federal Noxious Weed Act (Gunn & Ritchie, 1982) <u>NO</u> <i>Economically Important Foreign Weeds</i> (Reed, 1977) <u>NO</u> Weed Science Society of America list (WSSA, 1989) <u>NO</u> Is there any literature reference indicating weediness (e.g., <i>AGRICOLA</i>, <i>CAB</i>, <i>Biological Abstracts</i>, <i>AGRIS</i>; search on "species name" combined with "weed").
Phase 3:	Conclusion:
IF:	<ol style="list-style-type: none"> 1. The species is widely prevalent in the United States and the answer to all of the questions is no... Proceed with the pest risk assessment. 2. The species is widely prevalent in the United States and the answer to one or more of the questions is yes... Proceed with the pest risk assessment, provide comments on findings in text, and incorporate findings regarding weediness into the Risk Elements described below. 3. The species is new to or not widely prevalent in the United States and the answer to all of the questions is no... Proceed with the pest risk assessment. 4. The species is new to or not widely prevalent in the United States and the answer to one or more of the questions is yes... Consult authority under the Federal Noxious Weed Act for listing plant species as a noxious weed and consider the advisability of performing a pest-initiated pest risk assessment on the plant species. Provide explanations of findings in text.

3. Previous Risk Assessments, Current Status and Pest Interceptions

Decision History for *Serissa* spp. from China

Currently enterable as bare root plants

Pest Interceptions on bare root *Serissa foetida* from China - FY85-95**Arthropoda***Cyclocephala* sp. (Coleoptera: Scarabaeidae)

Diaspididae sp. (Homoptera)

Lepidosaphes laterochitinsa (Homoptera: Diaspididae)*Phyllophaga* sp. (Coleoptera: Scarabaeidae)**Fungi***Coniothyrium* sp*Didymosphaeria* sp.*Fusicoccum* sp.*Leptosphaeria* sp.*Microsphaeropsis* sp.*Phoma* sp.*Phomopsis* sp.*Stagonospora* sp.**4. Pests associated with *Serissa* spp. in China**

Scientific Name	Dist. ¹	Host Genera ²	Codes ²	References
ARTHROPODA and MOLLUSCA				
<i>Adoretus sinicus</i> Burmeister (Coleoptera: Scarabaeidae)	CN, HI	Poly. Camellia, Rosa, Diospyrus, Frimiana, Vitis, Theobroma, Morus Abelmoschus, Populus, Gossypium, Phaseolus, Asparagus	h, n, z(soil)	China, 1995; CFR 318.13; INKTO. No. 89
<i>Agrotis segetum</i> (D. & S.) (Lepidoptera: Noctuidae)	CN	Poly. Citrus, Malus, Olea, Vitis, Zea	n	Carter, 1984; China, 1995; INKTO, No. 25
<i>Amphimallon solstitialis</i> (L.) (Coleoptera: Scarabaeidae)	CN	Poly. Pinus, Beta, Solanum	n, z(soil)	Browne, 1968; China, 1995 CIE, 1979; INKTO, No. 99
<i>Anomala corpulenta</i> Motschulsky (Coleoptera: Scarabaeidae)	CN	Poly. Buxus, Juglans, Cunninghamia, Pinus, Malus, Juniperus, Prunus, Sabina, Salix, Ulmus, Vericia	z (soil)	China, 1994, 1995
<i>Anomala cupripes</i> Hope (Coleoptera: Scarabaeidae)	CN	Poly. Buxus, Camellia, Delonix, Ficus, Hevea, Dimocarpus, Litchi, Mangifera	z (soil)	China, 1994, 1995 Gordon, 1994

<i>Aphis gossypii</i> Glover (Homoptera: Aphididae)	CN, US	Poly. Ehretia, Sageretia, Serissa	c, z	China, 1994; CIE, 1968; Wilson and Vickery, 1918; Patch, 1938; Smith and Parron, 1978
<i>Aporia crataegi</i> L. (Lepidoptera: Pieridae)	CN	Poly. Crataegus, Malus, Prunus, Pyrus, Salix, Ulmus	n	China, 1995; INKTO, No. 149; Korea, 1972
<i>Atractomorpha sinensis</i> Bol. (Orthoptera: Acrididae)	CN	Poly. Serissa, Oryza, Chrysanthemum, Citrus, Rosa, Morus, Salix, Cinnamomum, Sapium, Camellia, Gossypium, Ipomoea, Nicotiana, Triticum, Zea, Prunus, Malus, Impatiens, Saccharum	z (soil)	China, 1994, 1995
<i>Bradybaena similaris</i> (Ferussac) (Mollusca: Bradybaenidae)	CN, US	Poly. Sageretia, Serissa	c, z, z(soil)	Chang and Chen, 1989; China, 1994; Dundee, 1970; Yen 1943
Cerambycidae, sp. (Coleoptera: Cerambycidae)	CN	Serissa, unknown	z	China, 1995
<i>Chrysodeixis chalcites</i> (Esper) (Lepidoptera: Noctuidae)	CN	Poly. Ficus, Brassica, Coffea, Cucumis, Cynara, Cucurbita, Echium, Glycine, Gossypium, Lycopersicon, Utica, Marrubium Medicago, Nicotiana, Phaseolus, Salvia, Solanum, Trifolium, Zea	n	China, 1995; CIE, 1977; Goodey, 1991; Taylor, 1980
<i>Conogethes punctiferalis</i> (Guenée) (Lepidoptera: Pyralidae)	CN	Poly. Gossypium, Pinus, Helianthus, Prunus, Pyrus, Sorghum, Zea, Castanea	n	China, 1995; INKTO
<i>Drosicha corpulenta</i> (Kuwana) (Homoptera: Margarodidae)	CN	Poly. Buxus, Magnolia, Paulownia, Plantanus, Salix, Melia, Sophora, Podocarpus, Ziziphus, Diospyros, Malus, Pyrus, Citrus, Prunus, Castanea, Quercus, Ficus	z (soil), z	China, 1994, 1995; Shiraki, 1952
<i>Gryllotalpa africans</i> Palisot de Beauvois (Orthoptera: Gryllotalpidae)	CN	Poly. Solanum, Dianthus, Saccharum, Gossypium, Vitis, Fragaria, Camellia, Prunus, Fortunella, Pinus, Nictotiana	n, z(soil)	China, 1995; INKTO, No 197

<i>Icerya purchasi</i> Maskell (Homoptera: Margarodidae)	CN, US	Poly. Buxus, Ehretia, Serissa	c, o, z	China, 1994, CIE, 1971; Myer, 1978; Salama, <i>et al.</i> , 1985
<i>Lepidosaphes laterochitinsa</i> Green (Homoptera: Diaspididae)	CN	Serissa, Aglaonema, Alstonia, Ardisia, Areca, Artocarpus, Illicium, Barringtonia, Bruguiera, Camellia, Casuarina, Cestrum, Citrus, Cocos, Cycas, Epipremnum, Eurya, Hevea, Maesa, Hyophorbe, Mangifera, Manihot, Persea, Smilax, Plumeria, Psidium, Vitis, Ravenala, Rhizophora, Schefflera, Ternstroemia	n, z	China, 1995; Hamon, 1988; PPQ interception
<i>Mamestra brassicae</i> (L.) (Lepidoptera: Noctuidae)	CN	Poly. Beta, Brassica, Daucus, Gossypium, Morus, Nicotiana, Pisum, Saccharum, Solanum, Triticum, Vicia	n	China, 1995; INKTO, No. 61
<i>Myzus persicae</i> (Sulzer) (Homoptera: Aphididae)	CN, US	Poly. Buxus, Ehretia, Serissa	c, z	Blackman and Eastop, 1994; China, 1994; Zhang and Zhong, 1983
<i>Phyllophaga</i> sp. (Coleoptera: Scarabaeidae)	CN	Poly. Serissa	n, z(soil), z	China, 1995; PPQ interception
<i>Phyllophaga titanis</i> Reitter (Coleoptera: Scarabaeidae)	CN	Poly. Buxus, Rosa, Sophora, Ulmus	z(soil)	China, 1995; Gordon, 1994
<i>Rhizococcus hibisci</i> Kawai & Takagi (Homoptera: Pseudococcidae)	CN, HI	Serissa, Cryptanthus, Rhaphis, Zelkova, Carex, Crinum, Cuphea, Sabal, Dieffenbachia, Hibiscus, Hakonechloa, Nerium, Pelargonium, Phoenix	z(soil)	EPPO
<i>Spodoptera litura</i> (F.) (Lepidoptera: Noctuidae)	CN	Poly. Arachis, Beta, Brassica, Citrus, Glycine, Gossypium, Ipomoea, Morus, Nicotiana, Oryza, Solanum, Sorghum, Ulmus, Zea	n	China, 1995; CIE, 1967; PNKTO, No. 12
<i>Sympiezomias velatus</i> Chevrolet (Coleoptera: Curculionidae)	CN	Sophora, Populus, Morus, Glycine, Beta, Castanea, 70 genera, 101 species recorded.	z(soil), z	China, 1995
<i>Thrips palmi</i> Karny (Thysanoptera: Thripidae)	CN, FL HI	Polyphygous	g, n	CIE, 1992; Smith <i>et al.</i> , 1992

<i>Tridactylus japonicus</i> de Hoan (Orthoptera: Trydactilidae)	CN	Buxus, Camellia, Cedrus, Fragaria, Gossypium, Oryza Nicotiana, Rosa, Sabina, Saccharinum	z (soil), z	China, 1994, 1995; Shiraki, 1952
"Calypsozele sp." (?) Unknown	CN	Podocarpus, Sageretia, Serissa, unknown	unknown	China 1994, 1995
"Incilaria sp." (?) Unknown	CN	Podocarpus, Serissa, Ehretia, Unknown	unknown	China, 1994, 1995
FUNGI				
<i>Fusicoccum</i> sp. (Species unknown) (Fungi Imperfecti, Coelomycetes)	CN	Serissa	Z _{ei}	China, 1995
<i>Melampsora serissicola</i> Shang, Li & Wang (Basidiomycetes, Uredinales)	CN	Serissa	Z _{ei}	Farr, <i>et al.</i> , 1989; Shang <i>et al.</i> , 1990;
<i>Pestalotiopsis</i> sp. (Species unknown) (Fungi Imperfecti, Coelomycetes)	CN	Serissa	Z _{ei}	China, 1992
<i>Phoma</i> sp. (Species unknown) (Fungi Imperfecti, Coelomycetes)	CN	Sageretia, Serissa	Z _{ei}	China, 1992; China, 1995
NEMATODA				
<i>Aphelenchoides besseyi</i> Christie (Aphelenchoididae)	CN, US	Various genera	o,z(soil)	Anonymous, 1984; EPPO, 1996a
<i>Aphelenchus</i> sp. (Aphelenchidae)	CN	Unknown	z(soil)	EPPO, 1996a
<i>Criconemella</i> sp. (Criconematidae)	CN	Unknown	z(soil)	EPPO, 1996a
Dorylaimidae sp. (Dorylaimidae)	CN	Unknown	z(soil)	EPPO, 1996a
<i>Dorylaimus</i> sp. (Dorylaimidae)	CN	Unknown	z(soil)	EPPO, 1996b
<i>Helicotylenchus</i> sp. (Hoplolaimidae)	CN	Unknown	z(soil)	EPPO, 1996a; 1996b
<i>Helicotylenchus dihystra</i> (Cobb) Sher (Hoplolaimidae)	CN, US	Various genera	o, z(soil)	Anonymous, 1984; EPPO, 1996a; 1996b

<i>Hirschmanniella</i> sp. (Pratylenchidae)	CN	Unknown	z(soil)	EPPO, 1996a; 1996b
<i>Meloidogyne incognita</i> Chitwood (Heteroderidae)	CN, US	Serissa	o, z(soil)	Anonymous, 1984
<i>Meloidogyne</i> sp. (Heteroderidae)	CN	Unknown	z(soil)	EPPO, 1996b
<i>Paratrophorus</i> sp. (Belonolaimiidae)	CN	Unknown	z(soil)	EPPO, 1996a
<i>Pratylenchus brachyurus</i> (Godfrey) Filipjev & Schuurmans Stekhoven (Pratylenchidae)	CN, US	Various genera	o, z(soil)	Anonymous, 1984; EPPO, 1996b
<i>Pratylenchus</i> sp. (Pratylenchidae)	CN	Unknown	z(soil)	EPPO, 1996a; b
<i>Rotylenchus robustus</i> (deMan) Filipjev (Hoplolaimidae)	CN, US	Various genera	o, z(soil)	EPPO, 1996b
<i>Trichodorus</i> sp. (Trichodoridae)	CN	Unknown	z(soil)	EPPO, 1996a
<i>Tylenchorhynchus</i> sp. (Tylenchorhynchidae)	CN	Unknown	z(soil)	EPPO, 1996a
<i>Tylenchorhynchus</i> <i>crassicaudatus</i> Williams (Tylenchorhynchidae)	CN	Oryza	z(soil)	EPPO, 1996a; b
<i>Tylenchorhynchus</i> <i>leviterminalis</i> Siddiqi, Mukherjee & Dasgupta (Tylenchorhynchidae)	CN	Unknown	z(soil)	EPPO, 1996a; b
<i>Tylenchus</i> sp. (Tylenchidae)	CN	Unknown	z(soil)	EPPO, 1996a
<i>Xiphinema brasiliense</i> Lordello (Longidoridae)	CN, US (FL)	Unknown	o, z(soil)	EPPO, 1996b
<i>Xiphinema</i> sp. (Longidoridae)	CN	Unknown	z(soil)	EPPO, 1996a; b

¹Geographical distribution is denoted by the following abbreviations: CN-People's Republic of China, FL-Florida, HI-Hawaii, US-United States

²Host genera identified in literature and by CAPQ

³Codes: c - Listed in non-reportable dictionary as non-actionable.

e - Although pest attacks commodity, it would not be expected to remain with the commodity (plant part) during processing

- g - Quarantine pest; pest has limited distribution in the U.S. and is under official control as follows:
pest listed by name in USDA's pest dictionary, official quarantine action may be taken on this pest when intercepted on this commodity.
- h - Quarantine pest; pest has limited distribution in the U.S. and is under official control as follows:
(1) pest listed by name in USDA's pest dictionary, official quarantine action may be taken on this pest when intercepted on this commodity and, (2) pest is a program pest (there is an official Federal or recognized State program for control of this pest beyond its being listed in the pest dictionary as actionable.)
- n - Listed in the USDA catalogue of intercepted pests as actionable.
- o - Organism does not meet the geographical and regulatory definition for a quarantine pest.
- z - Internal feeder: Pest is known to attack or infect commodity and it would be reasonable to expect the pest may remain with the commodity during processing and shipping

5. List of Quarantine Pests

Table 3: Quarantine Pests - *Serissa***ARTHROPODA**

- Adoretus sinicus* Burmeister (Coleoptera: Scarabaeidae)
Agrotis segetum (D. & S.) (Lepidoptera: Noctuidae)
Amphimallon solstitialis (L.) (Coleoptera: Scarabaeidae)
Anomala corpulenta Motschulsky (Coleoptera: Scarabaeidae)
Anomala cupripes Hope (Coleoptera: Scarabaeidae)
Aporia crataegi L. (Lepidoptera: Pieridae)
Atractomorpha sinensis Bol. (Orthoptera: Acrididae)
Chrysodeixis chalcites (Esper) (Lepidoptera: Noctuidae)
Conogethes punctiferalis (Guenée) (Lepidoptera: Pyralidae)
Drosicha corpulenta (Kuwana) (Homoptera: Margarodidae)
Gryllotalpa africans Palisot de Beauvois (Orthoptera: Gryllotalpidae)
Lepidosaphes laterochitinsa Green (Homoptera: Diaspididae)
Mamestra brassicae (L.) (Lepidoptera: Noctuidae)
Phyllophaga titanis Reitter (Coleoptera: Scarabaeidae)
Rhizoecus hibisci Kawai & Takagi (Homoptera: Pseudococcidae)
Spodoptera litura (F.) (Lepidoptera: Noctuidae)
Sympiezomias velatus Chevrollet (Coleoptera: Curculionidae)
Thrips palmi Karny (Thysanoptera: Thripidae)
Tridactylus japonicus de Hoan (Orthoptera: Trydactilidae)

MOLLUSCA

- Bradybaena ravida* (Benson) (Mollusca: Bradybaenidae)

UNKNOWN

- "*Calyptozele* sp." (?) Unknown
 "*Incilaria* sp." (?) Unknown

FUNGI

- Melampsora serissicola* Shang, Li & Wang (Basidiomycetes, Uredinales)

NEMATODA

- Paratrophorus* sp. (Belonolaimiidae)
Tylenchorhynchus crassicaudatus Williams (Tylenchorhynchidae)
Tylenchorhynchus leviterminalis Siddiqi, Mukherjee & Dasgupta (Tylenchorhynchidae)

6. Quarantine Pests Likely to Follow Pathway

Table 4: Quarantine Pests Likely to Follow Pathway -*Serissa*

ARTHROPODA

- Adoretus sinicus* Burmeister (Coleoptera: Scarabaeidae)
Agrotis segetum (D.&S.) (Lepidoptera: Noctuidae)
Amphimallon solstitialis (L.) (Coleoptera: Scarabaeidae)
Anomala corpulenta Motschulsky (Coleoptera: Scarabaeidae)
Anomala cupripes Hope (Coleoptera: Scarabaeidae)
Atractomorpha sinensis Bol. (Orthoptera: Acrididae)
Drosicha corpulenta (Kuwana) (Homoptera: Margarodidae)
Gryllotalpa africans Palisot de Beauvois (Orthoptera: Gryllotalpidae)
Lepidosaphes laterochitinsa (Homoptera: Diaspididae)
Phyllophaga titanis Reitter (Coleoptera: Scarabaeidae)
Rhizoecus hibisci Kawai & Takagi (Homoptera: Pseudococcidae)
Sympiezomias velatus Chevrollet (Coleoptera: Curculionidae)
Tridactylus japonicus de Hoan (Orthoptera: Trydactilidae)

MOLLUSCA

- Bradybaena ravida* (Benson) (Mollusca: Bradybaenidae)

UNKNOWN

- “*Calyptozele* sp.” (?) Unknown
 “*Incilaria* sp.” (?) Unknown

FUNGI

- Melampyris serissicola* Shang, Li & Wang (Basidiomycetes, Uredinales)

NEMATODA

- Paratrophorus* sp. (Belonolaimiidae)
Tylenchorhynchus crassicaudatus Williams (Tylenchorhynchidae)
Tylenchorhynchus leviterminalis Siddiqi, Mukherjee & Dasgupta (Tylenchorhynchidae)

Other organisms in this Assessment, not chosen for further scrutiny, may be potentially detrimental to the agricultural production systems of the United States. However, there were a variety of reasons for not subjecting them to further analysis: they may be associated with the commodity (however, it was not considered reasonable to expect these pests to remain with the commodity during processing); they have been intercepted, as biological contaminants, by PPQ Officers during inspections of these commodities and would not be expected to be found with every shipment.

7. Economic Importance: Consequences of Introduction

Pests rated for potential economic importance are evaluated against five biological factors. The cumulative score for these elements is the Risk Rating (USDA, 1995).

Pest	Climate/ Host	Host Range	Dispersal	Economic	Environ- mental	Risk Rating
<i>Adoretus sinicus</i>	H	H	H	M	M	H
<i>Amphimallon solstitialis</i>	H	H	H	M	M	H
<i>Anomala corpulenta</i>	H	H	H	M	M	H
<i>Anomala cupripes</i>	H	H	H	M	M	H
<i>Atractomorpha sinensis</i>	H	H	H	M	M	H
<i>Drosicha corpulentata</i>	H	H	H	M	M	H
<i>Grylotalpa africans</i>	H	H	H	M	M	H
<i>Lepidosaphes laterochitinsa</i>	H	H	H	M	M	H
<i>Phyllophaga titanis</i>	H	H	H	M	M	H
<i>Rhizoecus hibisci</i>	H	H	H	M	M	H
<i>Sympiezomias velatus</i>	H	H	H	M	M	H
<i>Tridactylus japonicus</i>	H	H	H	M	M	H
<i>Calyptozele</i> sp.	H	H	H	M	M	H
<i>Incilaria</i> sp.	H	H	H	M	M	H
<i>Melampsora serissicola</i>	H	L	H	M	M	M
<i>Paratrophorus</i> sp.	H	M	H	M	M	H

<i>Tylenchorhynchus crassicaudatus</i>	H	M	H	M	M	H
<i>Tylenchorhynchus leviterminalis</i>	H	M	H	M	M	H

8. Likelihood of Introduction

The likelihood of introduction for a pest is rated relative to six factors (Tables 6 and 7).

Number of 40' Containers Annually	Rating
10 - 100	M

Pest	Likelihood of surviving postharvest treatment	Likelihood of surviving shipment	Likelihood of not being detected at port of entry	Likelihood of moving to suitable habitat	Likelihood of finding suitable hosts	Risk Rating
<i>Adoretus sinicus</i>	H	H	H	H	H	H
<i>Amphimallon solstitialis</i>	H	H	H	H	H	H
<i>Anomala corpulenta</i>	H	H	H	H	H	H
<i>Anomala cupripes</i>	H	H	H	H	H	H
<i>Atractomorpha sinensis</i>	H	H	H	H	H	H
<i>Drosicha corpulenta</i>	H	H	H	H	H	H
<i>Gryllotalpa africans</i>	H	H	H	H	H	H
<i>Lepidosaphes laterochitinsa</i>	H	H	M	H	H	H
<i>Phyllophaga titanis</i>	H	H	H	H	H	H
<i>Rhizoecus hibisci</i>	H	H	H	H	H	H
<i>Sympiezomias velatus</i>	H	H	H	H	H	H

<i>Tridactylus japonicus</i>	H	H	H	H	H	H
<i>Calyptozele</i> sp.	H	H	H	H	H	H
<i>Incilaria</i> sp.	H	H	H	H	H	H
<i>Melampsora serissicola</i>	H	H	M	H	H	H
<i>Paratrophorus</i> sp.	H	H	H	H	H	H
<i>Tylenchorhynchus crassicaudatus</i>	H	H	H	H	H	H
<i>Tylenchorhynchus leviterminalis</i>	H	H	H	H	H	H

9. Pest Risk Potential

Pest Risk Potential is the combination of the consequences and likelihood of introductions (Tables 5, 6 and 7) (USDA, 1995).

Pest	Pest Risk Potential
<i>Adoretus sinicus</i>	H
<i>Amphimallon solstitialis</i>	H
<i>Anomala corpulenta</i>	H
<i>Anomala cupripes</i>	H
<i>Atractomorpha sinensis</i>	H
<i>Drosicha corpulenta</i>	H
<i>Gryllotalpa africans</i>	H
<i>Lepidosaphes laterochitinsa</i>	H
<i>Phyllophaga titanis</i>	H
<i>Rhizoecus hibisci</i>	H
<i>Sympiezomias velatus</i>	H
<i>Tridactylus japonicus</i>	H
<i>Calyptozele</i> sp.	H

<i>Incilaria</i> sp.	H
<i>Melampsora serissicola</i>	H
<i>Paratrophorus</i> sp.	H
<i>Tylenchorhynchus crassicaudatus</i>	H
<i>Tylenchorhynchus leviterminalis</i>	H

Phytosanitary Measures

Numerous potential biological hazards are associated with the importation of propagative material in growing media. In the case of Chinese penjing, the plants are grown in the open, in proximity to the ground and in or around agricultural production areas. Other factors which exacerbate the pest risk are inadequate pest control, plants collected from the wild, the continual flow of plant material into and out of facilities and soil movement from adjacent agricultural areas. These conditions act in concert to produce a great potential for contaminants, pest organisms of plants from nature and windborne infestations to establish in the nursery stock.

From the perspective of this risk assessment, most of the organisms of concern (some arthropods, snails, nematodes and weed seeds) are soil inhabitants during at least one portion of their life histories. Other potential hazards include fungal fruiting bodies with a latent period. These organisms have a high Pest Risk Potential and will require specific measures to insure phytosanitary security. Accordingly, mitigation measures based solely on Port of Entry inspections will be inadequate in providing this security. However, the choice of appropriate sanitary and phytosanitary measures to mitigate risks associated with these pest species is undertaken as part of Risk Management, and is not addressed, *per se*, in this document. Should additional pests, not identified in this Risk Assessment, be intercepted, appropriate quarantine action will be taken.

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- . Yellow peach moth (*Dichocrocis punctiferalis* Guen.). 2pp.
- . No. 25. Turnip moth (*Agrotis segetum* (Denis and Schiffermuller))
- . No. 61. Cabbage moth (*Mamestra brassicae* (L.)). 2pp.
- . No. 89. Chinese Rose Beetle (*Adoretus sinicus* Burm.). 2pp.
- . No. 99. Summer Chafer (*Amphimallon solstitialis* L.). 2pp.
- . No. 149. Black-veined white butterfly (*Aporia crataegi* Linnaeus). 3pp.
- . No. 197. African mole cricket (*Gryllotalpa africana* Beauvois). 3pp.
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<u>0001</u>	Volume 1 - Index page for Hawaiian Fruits	
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<u>0004</u>	Hawaiian Fruits - Atemoya	June 1996
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<u>0009</u>	Hawaiian Fruits - Rambutan	June 1996
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<u>0013</u>	Solanum melongena (Eggplant) - El Salvador and Nicaragua	March 1996
<u>0014</u>	Ocimum spp. (Brasil) - El Salvador (Decision Sheet/Memo)	
<u>0015</u>	Anethum graveolens (Dill) - Guatemala	March 1994
<u>0016</u>	Zingiber mioga (Mioga ginger) - Japan	January 1996
<u>0017</u>	Gentiana lutea (Gentiana) - Japan	
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<u>0019</u>	Petroselinum crispum (Parsley) - Israel	September 1997
<u>0020</u>	Punica granatum (Pomegranate) - Israel	September 1997
<u>0021</u>	Citrullus lanatus (Watermelon) - Brazil and Venezuela	May 1997
<u>0022</u>	Capsicum annuum (Pepper) - Chile	May 1996
<u>0023</u>	Physalis peruviana (Cape gooseberry) - Colombia	March 1997
<u>0024</u>	Lycopersicon esculentum (Tomato) - France	March 1997

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#	Description	Document Date 
0024	<i>Lycopersicon esculentum</i> (Tomato) - France	March 1997
0025	<i>Allium</i> spp. - Japan (into Guam & Hawaii)	October 1996
0027	<i>Citrus sinensis</i> , <i>C. limon</i> , <i>C. paradisi</i> (oranges, lemons, grapefruit) - Argentina	
0028	<i>Pisum sativum</i> var. <i>macrocarpon</i> (Snow peas) - Bahamas	March 1998
0029	Adult Queens, Package Bees and Germplasm of Honey Bees (<i>Apis mellifera</i>) L. from Australia	
0030	<i>Brassica</i> spp. - Mexico	February 1997
0031	<i>Carica papaya</i> (Papaya) - Brazil	July 1996
0032	<i>Passiflora edulis</i> (Purple passion fruit) - Chile	March 1996
0033	<i>Pyrus bretschneideri</i> , <i>P. ussuriensis</i> - China	January 1997
0034	<i>Lactuca sativa</i> (Lettuce) - Colombia	November 1997
0035	<i>Pisum sativum</i> var. <i>macrocarpon</i> (Snow peas) - Dominican Republic	January 1998
0036	<i>Pisum sativum</i> var. <i>macrocarpon</i> (Snow peas) - Guatemala	March 1998
0037	<i>Cucurbita maxima</i> , <i>Cucumis melo</i> , <i>C. sativus</i> , <i>Citrullus vulgaris</i> - Korea	October 1996
0038	<i>Pisum sativum</i> var. <i>macrocarpon</i> (Snow peas) - Mexico	September 1997
0039	<i>Salicornia bigelovii</i> (<i>Salicornia</i>) - Mexico	November 1997
0040	<i>Hylocereus</i> spp. (<i>Pityaya</i>) - Nicaragua (Decision Sheet/Memo)	
0041	<i>Anethum graveolens</i> (Dill) - Puerto Rico	March 1997
0042	<i>Beta vulgaris</i> var. <i>cicla</i> - Peru	December 1997
0043	<i>Cocos nucifera</i> (Coconut) - Thailand	December 1997
0044	<i>Zea mays</i> (Corn seed) - Ukraine	August 1996
0045	<i>Annona cherimola</i> (Cherimoya) - New Zealand	April 1997
0046	<i>Apium graveolens</i> var. <i>dulce</i> (Celery) - Dominica	April 1997
0047	<i>Carica papaya</i> (Papaya) - Panama	March 1997
0048	<i>Capsicum</i> spp. (Peppers) - Spain	June 1997
0049	<i>Asparagus officinalis</i> (Asparagus) - Honduras	April 1998
0050	<i>Actinidia chinensis</i> (Kiwi) - Argentina	July 1998
0051	<i>Brassica</i> spp. - Costa Rica, El Salvador, Honduras, Nicaragua	February 1997
0052	<i>Capsicum</i> spp. (Peppers) - New Zealand	June 2000
0053	<i>Nelumbo nucifera</i> (Waterlily, Lotus) - El Salvador, Guatemala, Honduras, and Nicaragua	March 2001
0054	<i>Petroselinum crispum</i> (Mill) Nyman Ex A.W. Hill (Parsley) - El Salvador and Honduras	March 2001

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0054	<i>Petroselinum crispum</i> (Mill) Nyman Ex A.W. Hill (Parsley) - El Salvador and Honduras	March 2001
0055	<i>Origanum</i> spp. (Oregano, Sweet Marjoram) - El Salvador and Honduras	April 2001
0056	<i>Matricaria recutita</i> L. (<i>Matricaria chamomilla</i> L.) (German Chamomile) - El Salvador, Guatemala, Honduras, and Nicaragua	March 2001
0100	Penjing Plants - China - Index Page	
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0109	Basil (<i>Ocimum basilicum</i>) from Honduras	July 2001
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0111	Loroco (<i>Fernaldia</i> spp.) from El Salvador, Guatemala, Honduras, and Nicaragua.	August 2001
0112	Mint (<i>Mentha</i> spp.) from El Salvador and Honduras.	September 2001
0113	Jicama (<i>Pachyrhizus</i> spp.) roots from El Salvador, Honduras, and Nicaragua.	October 2001
0114	Yard-long-bean from Nicaragua	December 2001
0115	Fig (<i>Ficus carica</i>) from Mexico	September 2001
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0512	Pest Risk Assessment: Importation of Adult Queens, Package Bees and Germplasm of Honey Bees, <i>Apis mellifera</i> L., From New Zealand	
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